

C O N T E N T S

EDITORIAL

4

On-line Notifications and E-Services Platforms

Dr Tan Tze Lee

DISTANCE LEARNING COURSE ON “ON-LINE NOTIFICATIONS AND E-SERVICES PLATFORMS”

6

Overview of “On-line Notifications and E-Services Platforms” Course

A/Prof Goh Lee Gan

8

Unit 1: Overview of On-line Notifications and E-Services Platforms

A/Prof Goh Lee Gan

13

Unit 2: Infectious Diseases Act and On-line Notifications of Infectious Diseases

Contributed by Communicable Diseases Division, Ministry of Health

18

Unit 3A: Communicable Diseases Live and Enhanced Surveillance System (CD-LENS)
and Health Professionals Portal (HPP)

Contributed by Communicable Diseases Division, Ministry of Health

21

Unit 3B: Clinical Management System

Contributed by CrimsonLogic Pte Ltd

25

Unit 4: Reporting of Occupational Diseases in Singapore

Dr Kenneth Choy, Alvian Tan Xingyong, Lee Chin Soon, Ong Peh Woon

31

Unit 5: Immunisation Uptake in Singapore

Abirami Jayawardena, Chng Chee Yeong, Royceton Martin, Dr Chew Ling

36

Unit 6: HSA Adverse Event Watch – Partnership in Vigilance

Belinda Tan, Dorothy Toh, Sally Soh

39

Assessment of 30 MCQs

READINGS

44

A Selection of Ten Current Readings on On-line Notifications and E-Services Platforms

ORIGINAL PAPER

52

Diabetes Mellitus and Fasting During Ramadan

Dr Chong Tsung Wei

80

Guidelines and Information for Authors

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ON-LINE NOTIFICATIONS AND E-SERVICES PLATFORMS

Dr Tan Tze Lee

SFP2011; 37(2): 4

The 21st century consolidated the transformation of our global community into an electronically connected global village. In the thirty years of the Internet revolution, it has evolved from being a fledgling portal between academics in the 1980's to being the behemoth it is today.

E-commerce, E-mail, E-medicine; just about every aspect of our lives is touched by the on-line electronic world. How much more so is the situation in our citystate, where just about every home has access to broadband.

The medical landscape has also evolved. Many functions of medical notifications now have an electronic equivalent. Myriad E-Services are also available now online, often saving the busy professional a trip down to the Ministry of Health or other agencies. These changes allow for more efficient use of manpower as well as reducing paper and office clutter.

In Unit 1, we note that on-line notifications include notifications of infectious diseases, of industrial diseases and accidents, post-vaccination adverse reactions, and reporting of adverse events to health products.

In Unit 2, we are reminded of the Infectious Diseases Act of 1976 and the evolution of the notification process. The accuracy of on-line notification of cases of Infectious Diseases will save the delay that will result from the additional time and effort taken to verify information as the result of missing data and illegible handwriting

TAN TZE LEE, Honorary Editor, College of Family Physicians Singapore

in fax transmissions. Timeliness of release of outbreak information will be improved.

In Unit 3A, we are reminded of the CD-LENS, the "Communicable Diseases Live and Enhanced Surveillance System" which was launched in 2006. This one-stop Internet portal is a godsend for medical practitioners to keep abreast of infectious disease developments. In Unit 3B, the steps for doing e-filing are described.

In Unit 4, we note the need to diagnose and notify cases of occupational diseases. A good working knowledge of the notification process in this area will enhance our ability to increase notification rates.

In Unit 5, we revisit the uptake of immunisation and its role in preventing disease. Immunisation has been an essential component of our medical armamentarium since the days of Jenner and Pasteur. However apart from infant vaccination, rates of other vaccinations remain less than ideal. E-notification can help monitoring and surveillance of vaccination rates, with the aim that vaccination rates can improve and this in turn will be translated to better herd immunity.

In Unit 6, we note the importance of reporting of adverse events to health products. The paper provides good insight and advice on the necessary steps to make in a report, and the process is now made all the easier with the e-Services platforms.

As IT continues to evolve quickly in our Singapore society, we too as medical practitioners need to adapt to embrace these new technologies, so as not to be left behind. This issue of the SFP aims to create an awareness of the benefits of on-line notifications and e-Services platforms to deliver services and care for our patients.



DISTANCE LEARNING COURSE ON “ON-LINE NOTIFICATIONS AND E-SERVICES PLATFORM”

- Overview of “On-line Notifications and E-Services Platforms”
Family Practice Skills Course
- Unit 1 : Overview of On-line Notifications and E-Services Platforms
- Unit 2 : Infectious Diseases Act and On-line Notifications of Infectious Diseases
- Unit 3A : Communicable Diseases Live and Enhanced Surveillance System (CD-LENS)
and Health Professionals Portals (HPP)
- Unit 3B : Clinical Management System
- Unit 4 : Reporting of Occupational Diseases in Singapore
- Unit 5 : Immunisation Uptake in Singapore
- Unit 6 : HSA Adverse Event Watch – Partnership in Vigilance

OVERVIEW OF “ON-LINE NOTIFICATIONS AND E-SERVICES PLATFORMS” FAMILY PRACTICE SKILLS COURSE

A/Prof Goh Lee Gan

SFP2011; 37(2): 6-7

INTRODUCTION

The objective of this Family Practice Skills Course is to update doctors on the benefits and changes that need to be implemented for on-line notifications and use of e-Services platforms. On-line notifications include notifications of infectious diseases, of industrial diseases and accidents, post-vaccination adverse reactions, and reporting of adverse events to health products. E-Services platforms are provided by Government agencies, other organizations and agencies both locally and worldwide, and evidence based resources. The move to such implementation involves a three-step strategy -- being aware of the benefits of on-line and e-Services platforms; working with other stakeholders on specific changes needed to make a successful change; and planning, testing, and implementing all aspects of the transition from one organizational structure and process to another.

COURSE OUTLINE AND CME POINTS

This Family Practice Skills Course is made up of the following components. You can choose to participate in one or more parts of it. The CME points that will be awarded are also indicated below.

Components and CME Points

- Distance Learning Course – 6 units (6 CME points upon completing the Distance Learning On-line Assessment).
- 2 Seminars (2 CME points per seminar cum workshop).
- 2 Workshops.
- 10 Readings – read 5 out of 10 recommended journals (max. of 5 CME points for the whole CME year).

Distance Learning Course

Unit 1 : Overview of On-line Notifications & E-Services Platforms

A/Prof Goh Lee Gan

Unit 2 : Infectious Diseases Act and On-Line Notifications of Infectious Diseases

Communicable Diseases Division, Ministry of Health

GOH LEE GAN, Associate Professor, Head, Division of Family Medicine, University Medicine Cluster, National University Health System
Senior Consultant, Institute of Family Medicine, College of Family Physicians Singapore

Unit 3A: Communicable Diseases Live and Enhanced Surveillance System (CD-LENS) and Health Professionals Portal (HPP)
Communicable Diseases Division, Ministry of Health

Unit 3B: Clinical Management Systems

Crimson Logic Private Limited

Unit 4 : Reporting of Occupational Diseases in Singapore

Dr Kenneth Choy, Alvian Tan Xingyong, Lee Chin Soon, Ong Peh Woon

Unit 5 : Immunisation Uptake in Singapore

Abirami Jayawardena, Chng Chee Yeong, Royceton Martin and Dr Chew Ling

Research & Strategic Planning Division, Health Promotion Board

Unit 6 : HSA Adverse Event Watch – Partnership in Vigilance

Belinda Tan, Dorothy Toh, Sally Soh

COURSE TOPIC DETAILS

Unit 1: Overview of On-line Notifications & E-Services Platforms

- Introduction.
- The digital present and future.
- Notifications – from hard copy to online.
- E-Services platforms.
- Clinic management system.
- Management of change.

Unit 2: Infectious Diseases Act and Notification of Infectious Diseases

- Background.
- On-line Notification of Infectious Diseases.
- Problems with Fax Notifications.
- Promotion of Online Notification of Infectious Diseases.

Unit 3A: Communicable Diseases Live and Enhanced Surveillance System (CD-LENS) and the Health Professionals Portal (HPP)

- Introduction.
- Functions of CD-LENS.
- Infectious Disease Notification.
- Healthcare Professionals Portal (HPP).

Unit 3B: Clinical Management System

- Introduction.
- Doing e-filing.

Unit 4: Reporting of Occupational Diseases in Singapore

- Introduction.
- Statutory duty to notify occupational diseases.
- Purpose of reporting.
- MOM's electronic reporting system – iReport.
- Diagnosing an occupational disease.
- Work injury compensation in Singapore.

Unit 5: Immunisation Uptake in Singapore

- Introduction.
- The Role of the Family Physician in the National Immunisation Programme.
- Immunisation Coverage in Singapore.
- The Use of Immunisation Data for Public Health Practice.

Unit 6: HSA Adverse Event Watch – Partnership in Vigilance

- What is an Adverse Event?
- What to Report?
- What is a Serious Adverse Event or Reaction?
- How many AE reports have HSA received?
- What Type of Information is collected on AE Reporting Forms?
- Submit your AE Reports On-line – A Faster and Easier Option
- How to Gain Access to HSA AE Database?
- How would your report contribute to safety surveillance of health product?
- What are the types of safety information and how are they communicated?

FACE-TO-FACE SESSIONS

Seminar 1: 5 March 2011

2.00pm – 4.00pm

Unit 1 : Overview of On-line Notifications & E-Services Platforms

A/Prof Goh Lee Gan

Unit 2 : Infectious Diseases Act and On-line Notifications of Infectious Diseases

Dr Jeffery Cutter

Unit 3 : Communicable Diseases Live and Enhanced Surveillance System (CD-LENS)

Dr David Cheong

Workshop 1: 5 March 2011

4.30pm – 5.30pm

Notification of Cases of Communicable Diseases Using the Clinical Management System

Dr Muhammad Iqbal

Seminar 2: 6 March 2011

2.00pm – 4.00pm

Unit 4 : Reporting of Occupational Diseases in Singapore

Dr Kenneth Choy

Unit 5 : Immunisation Uptake in Singapore

Dr Jonathan Pang

Unit 6 : HSA Adverse Event Watch - Partnership in Vigilance

Ms Dorothy Toh

Workshop 2: 6 March 2011

4.30pm – 5.30pm

Case Studies/Demo:

- On-line Reporting of Occupational Diseases

Dr Kenneth Choy

- On-line Notification of Immunisation

Mr Royceton Martin

- Importance of ADR Reporting: A Clinician's Perspective

Prof Chng Hiok Hee

UNIT NO. I

OVERVIEW OF ON-LINE NOTIFICATIONS & E-SERVICES PLATFORMS

A/Prof Goh Lee Gan

ABSTRACT

On-line notifications and e-Services platforms are changes brought about by the Internet and the information technology developments in the last 30 years. The sum total is the inexorable change to the way we look things up, be connected, and get things done. On-line notifications include notifications of infectious diseases, of industrial diseases and accidents, post-vaccination adverse reactions, and reporting of adverse events to health products. E-Services platforms are provided by Government agencies, other organizations and agencies both locally and worldwide. Doctors of Generation X, the so-called digital immigrants may find it challenging to get into the digital world. Yet it is not impossible. It involves a 3-step strategy -- being aware of the benefits of on-line and e-services platforms; working with other stakeholders on specific changes needed to make a successful change; and planning, testing, and implementing all aspects of the transition from one organizational structure and process to another. The Ministry of Health, the College of Family Physicians, Singapore, and early adopters of the new healthcare delivery system can work together to make the change less steep for doctors in need of assistance.

SFP2011; 37(2): 8-12

INTRODUCTION

On-line notifications and e-Services platforms are changes brought about by the Internet and the information technology developments in the last 30 years. The sum total is the inexorable change to the way we look things up, be connected, and get things done.

People can be divided into the younger or “Generation Y” who is also dubbed the “Google Generation” and the older generation or “Generation X” who is also dubbed “Digital immigrant”. (Spring, 2010)¹. Whilst Generation Y takes to digital way of doing things quite comfortably, Generation X has to struggle to fit into the digital age – some more than others. The purpose of this Family Practice Skills Course is to provide information on the scope of benefits and the steps that need to be taken to practice effectively in the digital present and future.

GOH LEE GAN, Associate Professor, Head, Division of Family Medicine, University Medicine Cluster, National University Health System
Senior Consultant, Institute of Family Medicine, College of Family Physicians Singapore

In a nutshell:

- The Google search engine has become so good and fast that to “Google” what we want is replacing reaching out for a dictionary, textbook, document, or newspaper. The Wikipedia is the encyclopedia that is on-line. Of course, Google is not the panacea for any knowledge gap but more of that later. (Sim, Khong, & Jiwa, 2008; Spring, 2010).^{2,1}
- Health related information websites e.g., HPB-online, provide the information that we need to look up things, and to obtain education materials for our professional use and also for the patient.
- Through the service portals work gets done – notifications, applications, submission of various information, and information access for decision making in the course of our professional work are examples where increasingly, work can be done through internet portals. See Table 1. (MOH, 2008)³.

THE DIGITAL PRESENT AND FUTURE**iN2015 – Infocomm Development Authority of Singapore (IDA)’s vision and goals**

The Infocomm Development Authority of Singapore (IDA)’s iN2015 vision can be stated as “an intelligent nation, a global city, powered by infocomm.” The three elements to build the competitive capability into the future are: high speed infocomm infrastructure; sectoral transformation in the 10 sectors, of which healthcare is one sector; and a developed workforce that is IT literate and savvy. (IDA, 2010)⁴.

Much of the infocomm infrastructure available worldwide is now everyday equipment in Singapore. See Figure 1. Sectoral transformation and the actions to create a developed workforce that readily exploits IT are in progress.

Among the goals of iN2015 are 90% broadband usage in all homes in Singapore, and a 100% computer ownership in homes and school-going children. (IDA, 2010)⁴.

Healthcare

Healthcare is one of the 10 sectors that IDA is enhancing in its iN2015 vision. The other 9 sectors are: Digital media & entertainment; Education; Financial services; Manufacturing & Logistics; Land management & transport; Tourism, hospitality & retail; Infocomm@SME programme; Society; and Government. (IDA, 2010)⁴.

The goal of the iN2015 programmes for the healthcare sector is to accelerate its transformation through an infocomm-enabled personalized healthcare delivery system to achieve

high quality clinical care, service excellence, cost-effectiveness and strong clinical research. There are several elements to be developed in healthcare infrastructure (IDA, 2010)⁴.

National Electronic Health Record (NEHR)

The National Electronic Health Record aims to enable the exchange of health information across the healthcare continuum by allowing secure “real-time” access to patients’ NEHR by authorised clinicians and healthcare providers (IDA, 2010)⁴.

Integrated Clinical Management System (CMS)

The CMS programme that was completed in December 2008, aimed to encourage greater infocomm adoption by General Practitioner (GP) clinics to facilitate their operations. Moving forward, its next strategy the GP IT-Enablement programme was launched in 2009 to encourage greater adoption of Electronic Medical Records (EMRs) in the GP community starting with a pilot in 2011. (IDA, 2010)⁴.

Personal Health Record (PHR) Programme

The PHR Programme seeks to empower individuals to optimally manage their health condition. Phase 1 of the programme was completed in April 2009, with the implementation of the Singapore eHealth Portal. Self-management modules such as the Behavioural Health Intervention Tools are made available on the portal to facilitate the use of the PHR by individuals. Moving forward, the portal pilot will inform a broader approach to Personal Health Management that will leverage the NEHR data and infrastructure in Phase 2 (IDA, 2010)⁴.

Intermediate and Long Term Care

The Community Hospital programme aims to leverage on infocomm technologies to better improve clinical care and achieve greater operational efficiency for six community hospitals. The platform will also be linked to the NEHR to facilitate care co-ordination and management across care institutions. (IDA, 2010)⁴.

NOTIFICATIONS – FROM HARD COPY TO ON-LINE

Notifications of infectious diseases, immunization activities, chronic disease (that are tracked in disease registries), and adverse events in medication use, together form the public health surveillance framework for control of disease in the community.

The two key purposes of notifications are to obtain:

- Surveillance information on diseases, events, activities of importance to health of the community.
- Indication for public action – outbreak levels have been reached e.g. dengue cases; next level of action required e.g. pandemic levels.

Going on-line

Hitherto, notifications of infectious diseases have been submitted electronically – through on-line platforms and hard copy forms submitted by faxes. Information received through fax need to be input into databases before data crunching and information for public action can be generated. As it is pointed out in Unit 2 (Communicable Diseases Division, Ministry of Health, 2011)⁵, the move to on-line notification will result in timeliness of outbreak information.

It will however require the participation of every healthcare provider for a successful on-line notification system. As of 17 Dec 2010, there are more than 2000 general and specialist clinics licensed under the Private Hospitals & Medical Clinics (PHMC) Act. Every clinic has provided an email address for the purpose of the MOH Med-Alert. (Communicable Diseases Division, Ministry of Health, 2011)⁵.

Notifications of diseases required in Singapore

Table 1 shows the notifications related to healthcare required in Singapore. They are discussed in detail in Units 2 to Unit 6 of this family practice skills course:

- Unit 2 – Infectious diseases.
- Unit 3 – Communicable Diseases - Live & Enhanced Surveillance (CD Lens) – one stop internet portal for infectious diseases notification and outbreak management.
- Unit 4 – Occupational diseases and accidents.
- Unit 5 – Immunisation update.
- Unit 6 – Reporting of adverse events to health products.

E-SERVICES PLATFORMS

Government agencies

Table 1 also lists the e-Services available linked with the various Government agencies namely, Ministry of Health, Singapore Medical Council, and the Health Care Clusters. Each of the website is also a store-house of healthcare information.

Ministry of Health website

The site contains information on the Health Care System in Singapore, Health care financing, Healthcare facilities, Healthcare services, Diseases and conditions, Funding and health research (MOH website, 2011)⁶.

The health professionals /service providers page provides a link to the Health Professional Portal (HPP), the electronic licence application page, CD-LENS page, the notification of infectious disease form, information for participation in Medisave/Medishield Accreditation Scheme, and Participation in the chronic disease management scheme. (MOH website, 2011)⁶.

TABLE I. List of On-line services available in 2011

Government agency	e-Services: Notifications, Applications, Submissions, Information access Source : MOH, 2008 and updated
Notifications	
HPB	Notification to National Immunisation Registry (NIR)
HPB	Notification to National Disease Registry (NDR)
MOH	Notification of Infections Disease
MOM	Notification of industrial disease, and accidents
HSA	Notification of Post-Vaccination Adverse Reaction
HSA	Reporting of adverse events to health products
Applications	
MOH	Application for medical registration
	Application for Extension of Temporary Registration
SMC	Application for certificate of good standing
SMC	Pre-Registration training application form
SMC	Application for renewal of practising certificate
SMC	Application for Registration of Additional Qualification
Submissions	
MOH	Submission of Medisave Claims (CDMP)
MOH	Submission Chronic Disease Indicators (Medisave for CDMP)
Clusters	Submission of PCPS claims and chronic disease clinical indicators through cluster e-Services & Integrated Clinic Management System
Information access	
MOH	Access to on-line laboratory results (from Integrated Screening Programme) via the Integrated Clinic Management System
MOH & Clusters	On-line medical records – work in progress in linking up with private sector

Health Professionals Portal (HPP)

Life is made easier by one-stop portals. A good example is the Health Professionals Portal (HPP). This is a one-stop portal for the healthcare professionals to access multiple secure e-Services and information using a common password entry and interface. This removes the need for separate password access to each MOH or Professional Board’s e-Services. Future health professional e-Services would also be able to use HPP to authorise entry of healthcare professionals registered in Singapore. (HPP website, 2011)⁷.

Within the HPP website, one can search healthcare professionals, healthcare establishments, medical specialist training, and accreditation.

One can also get on to various important websites with one click of the mouse – namely, that of Ministry of Health, Health Promotion Board, Health Sciences Authority, National Health Care Group, Singhealth, National University Health System, Alexandra Health Pte Ltd, College of Family Physicians, Singapore, and Singapore Medical Association.

Within HPP are also links to healthcare topics e.g. Influenza A (H1N1), Avian Influenza, Adverse Drug Reaction News, Advance medical directive, Medical Acts and Statutes, and Safety information on drugs and health products.

Other websites providing information related to health and healthcare

There is a plethora of websites providing information related to health and healthcare. The following are a sampling of such websites:

General information websites

- eCitizen – the health & environment section – useful for general information relevant to Singapore; the other sections are also useful for general knowledge relevant to the Singapore context.

Public Health and communicable disease websites

- World Health Organisation.
- Centers for Disease Control.

Medical Associations and Academic bodies

- Singapore Medical Association (SMA).
- College of Family Physicians, Singapore (CFPS).
- Academy of Medicine, Singapore.
- American Academy of Family Physicians, Royal Australian College of General Practitioners, Royal College of General Practitioners, and similar websites.

Journal websites

- Asia Pacific Journal of Family Medicine, Annals of Internal Medicine, British Medical Journal (BMJ), Journal of American Medical Association (JAMA), Canadian Medical Association Journal (CMAJ), and many other websites too many to mention by name.

Background information on primary healthcare

- GP Handbook – created for GPs practicing in the UK – very useful to look up family medicine relevant topics.
- e-Medicine.

Foreground information on healthcare

- **Up-to-date** – This is a clinical decision support system that helps clinicians throughout the world provide best practice. It is a repository of current evidence to answer clinical questions quickly and easily at the point of care. This saves clinicians time, improves outcomes and lowers health care costs.
- **PubMed** – This is a service of the U.S. National Library of Medicine that has over 19 million citations from MEDLINE and other life science journals.

Google as a search engine for healthcare information

A small survey of GPs in Perth, Australia (n = 132) in 2007 found that Google was the most popular site used by respondents. Twenty-five respondents provided comment about

their use of Google. It was particularly valued for its ability to lead to other websites of value (n=9), ease of use (n=8), its fast search engine (n=5), convenience (n=4), and wide applicability (n=4). Three respondents noted that Google was a good starting point for finding information that led to other sites. One respondent said it was useful to find medical information for patients. (Sim, Khong, & Jiwa, 2008)².

In the same study by Sim et al, 2008, it is clear that GPs assess the credibility of websites. Examples of comments relating to websites used are:

- “God patient handouts, worksheets” – Centre for Clinical Intervention.
- “Validated information” – Centre for Disease Control.
- “Reliable, good pictures”, “Good concise information” – Dermnet.
- “Good summary of information” – Family Practice Handbook.

Google is used as a starting point to find information on the internet. More specific websites are chosen as a result of familiarity and assessment of value of the information. More work remains to be done on how GPs assess the credibility of and make choices about websites. (Sim, Khong, and Jiwa)¹.

Keeping up with the literature with evidence based resources

There are now available websites that help medical practitioners keep up with the medical literature with evidence based resources. Table 2 shows a selection of such resources relevant to primary care. (Shaughnessy, 2009).

An overview of on-line notifications and e-Services platforms is not complete without a brief description of the clinic management system, and the management of change in the digital age.

CLINIC MANAGEMENT SYSTEM

Clinic management tasks and check list

A clinic management system needs to fulfill a number of tasks that would cater to both the administrative and clinical functions of the business. Current available systems in Singapore lacks clinical maturity hence there are national strategies on-going to develop suitable IT systems that meets our local needs for GPs to adopt IT successfully.

The following is a check list of the tasks that could be available in such a system:

- Registration of patients and maintenance of a patient database.
- Queue system with LCD TV with SMS alert to patients when their Q no. is up.
- Drug inventory.

Table 2. Source & description of evidence based resources

<ul style="list-style-type: none"> • American College of Physicians Journal Club (http://www.acpj.org) -- One-page summaries of about 30 valid research papers. Published biweekly in <i>Annals of Internal Medicine</i>. Articles are rated for relevance by a national network of primary care physicians.
<ul style="list-style-type: none"> • Bandolier (http://www.medicine.ox.ac.uk/bandolier) -- Monthly on-line newsletter on evidence based topics.
<ul style="list-style-type: none"> • Daily POEMs Alerts (http://www.essentialvidenceplus.com/product/features_dailyip.cfm) -- Daily e-mail summary of a single valid research article.
<ul style="list-style-type: none"> • Evidence-Based Practice newsletter (http://www.ebponline.net) -- Evidence-based answers to common clinical questions in primary care. Produced by the Family Physicians Inquiries Network (http://www.fpin.org). Questions are derived from sentinel practices. Their relevance is graded, and the evidence for the answer is systematically reviewed, analyzed, and rated.
<ul style="list-style-type: none"> • Evidence Updates from the BMJ Evidence Centre (http://plus.mcmaster.ca/evidenceupdates) -- Weekly e-mail updates of article titles linked to Medline abstracts. Validated evidence considered to be relevant and newsworthy.
<ul style="list-style-type: none"> • Journal Watch (http://www.jwatch.org) -- Biweekly print or on-line newsletter. Annotated reviews of clinically important studies from a broad array of medical journals.

Source: Shaughnessy, 2009

- Dispensing including allergy alerts, and label printing.
- Medical Certificate issue.
- Appointment system. If it can also provide auto SMS alerts for the patients this will be good too.
- Billing of patients individually and also corporate billing. If it can also produce Medisave billing, that will be an additional feature.
- Reports – depending on need. This can range from statistical charting for patient parameters, disease statistics, demographics, to income & expense reports.
- Electronic clinical documentation.

Of these features, developing an electronic medical record that is easy to enter and retrieve information for patient referral letter writing and medical reporting is an important end in mind.

MANAGEMENT OF CHANGE

Doctors of Generation X, the so-called digital immigrants, may find it challenging to get into the digital world. Yet it is not impossible. It involves a 3-step strategy -- being aware of the benefits of on-line and e-Services platforms; working with other stakeholders on specific changes needed to make a successful change; and planning, testing, and implementing all aspects of the transition from one organizational structure and process to another. The Ministry of Health, the College of Family Physicians, Singapore, and early adopters of the new healthcare delivery system can work together to make the change less steep for doctors in need of assistance.

CONCLUSIONS

The Internet and information technology has surreptitiously introduced changes to the way we look up information, be connected, and get things done. On-line notifications and use of e-Services platforms increasingly will be the new way of getting things done. By creating awareness, and helping doctors, particularly those in Generation X, to bridge the digital gaps between past, present and into the future, mastery of the digital future envisioned by iN2015 for the healthcare sector should be possible.

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LEARNING POINTS

- **On-line notifications and e-Services platforms are changes brought about by the Internet and the information technology developments in the last 30 years.**
 - **On-line notifications include notifications of infectious diseases, of industrial diseases and accidents, post-vaccination adverse reactions, and reporting of adverse events to health products.**
 - **E-Services platforms are provided by Government agencies, other organizations and agencies both locally and worldwide.**
 - **A 3-step strategy can be used to help doctors get into the digital world.**
 - **The Ministry of Health, the College of Family Physicians, Singapore, and early adopters of the new healthcare delivery system can work together to make the change to the digital world less steep for doctors in need of assistance.**
-

UNIT NO. 2

INFECTIOUS DISEASES ACT AND ON-LINE NOTIFICATIONS OF INFECTIOUS DISEASES

Contributed by Communicable Diseases Division, Ministry of Health

ABSTRACT

The Infectious Diseases Act (IDA), which was enacted by Parliament in 1976 and came into force on 1 August 1977, is the principal piece of legislation that deals with the prevention and control of infectious diseases in Singapore. For the control of infectious diseases in Singapore, the IDA provides for the notification of specified infectious diseases. Notifications of infectious diseases is an important strategy allowing MOH to monitor and detect occurrences of infectious diseases, so that prompt epidemiological actions can be taken to institute control and prevention measures, to prevent further transmission of the disease, or to alleviate an outbreak. Under the Infectious Diseases (Notification of Infectious Diseases) Regulation 2008, notification of an infectious disease should be given by facsimile transmission (fax) or through the electronic notification system.

SFP2011; 37(2): 13-17

BACKGROUND

The Infectious Diseases Act (IDA), which was enacted by Parliament in 1976 and came into force on 1 August 1977, is the principal piece of legislation that deals with the prevention and control of infectious diseases in Singapore. This legislation is jointly administered by the Ministry of Health (MOH) and the National Environment Agency (NEA).

For the control of infectious diseases in Singapore, the IDA provides for the notification of specified infectious diseases. Notification of infectious diseases is an important strategy allowing MOH to monitor and detect occurrences of infectious diseases, so that prompt epidemiological actions can be taken to institute control and prevention measures, to prevent further transmission of the disease, or to alleviate an outbreak. Under the Infectious Diseases (Notification of Infectious Diseases) Regulation 2008, notification of an infectious disease should be given by facsimile transmission (fax) or through the electronic notification system.

The information collated from the notifications is then analysed and fed back to the medical practitioners in various forms, including weekly online news bulletins, quarterly Epidemiological News Bulletins, as well as the annual communicable diseases surveillance report. For regular updates of local and regional outbreak situations which are constantly evolving, medical practitioners can even log on to the online Communicable Diseases Live & ENhanced Surveillance (CDLENS) programme. In this way, they can be kept up-to-date with regard to the latest incidence and epidemiology of infectious diseases, thus aiding them in the screening, diagnosis and management of their patients.

All publications are freely available for viewing on the MOH internet webpage. For CDLENS, medical practitioners will have to log on with their Singapore Medical Council (SMC) assigned ID and password, or their own Singpass. Examples of the various publications, as well as a screen capture of the CDLENS can be found in Annex A.

On-Line Notification of Infectious Diseases

The widespread use of the internet in Singapore has become increasingly apparent in recent years. In 2008, 76% of households in Singapore were reported to have access to Internet, up from 71% in 2006. Significant progress has also been made in the development of IT tools and programmes to improve, modernise and transform the way medicine is practiced. These tools and programmes include the Health Professionals Portal, the MOH Communicable Diseases Live & ENhanced Surveillance (CDLENS), MOH MedAlert, the Clinical Management System (CMS) and the Electronic Licence Application (eLA).

As at 17 Dec 2010, there were more than 2000 general and specialist clinics licensed under the Private Hospitals & Medical Clinics (PHMC) Act. Every clinic has provided an email address for the purpose of the MOH MedAlert. Furthermore, based on the enrolment of GP clinics for the Chronic Disease Management Programme (CDMP), at least 46% of all GP clinics had computers and Internet access.

It is with this trend in mind, as well as the other potential benefits which can be reaped, that MOH encourages doctors to submit notifications of infectious diseases online.

Problems with Fax Notifications

With online notification of infectious diseases, the following problems currently encountered will be overcome.

Data Content

Fax notifications contributed to the problem of incomplete data submission. The notifying doctor is contacted to verify relevant information as a result of missing data or illegible handwriting. This is not productive, and is time-consuming on the doctors' part as well.

Data Security

There have been incidents of reporting physicians submitting their fax notifications to the wrong locations. Although these incidents were rare, potentially sensitive patient information could have been compromised as a result of a system which is prone to human error. This potential breach of patient confidentiality also left the medical practitioner liable for litigation.

Timeliness of outbreak information

In 2009, MOH received a total of 45,609 infectious disease notifications. 68.3% of notifications were made via fax, and almost 80% of fax notifications received were from the private sector. During the H1N1 pandemic, there was a sharp increase in notifications from an average of about 4,400 per month in 2008 to about 5,500 per month in June and July 2009. The fax transmission resulted in a delay in data entry, collation and analysis of outbreak information. Further delay resulted when additional time and effort was taken to verify information as a result of missing data / illegible handwriting.

Consultation with Professional Bodies

Professional bodies, namely the Singapore Medical Association (SMA), College of Family Physicians, Singapore (CFPS) and Singapore Medical Council (SMC), were consulted and were cognizant of the need to embrace on-line notification.

Promotion of On-Line Notification of Infectious Diseases

MOH will continue to work with the CFPS and SMA to encourage doctors to make use of the CDLENS to submit notifications of infectious diseases. In line with these efforts, MOH together with CFPS, will engage doctors through workshops like the Family Practice Skills Course. This will be conducted for private sector doctors to increase awareness of and to provide training on the use of on-line services.

CONCLUSION

Under the current climate of increasing internet use by the general population and increased availability of relevant IT solutions, the use of IT in the practice of medicine in Singapore is a definite eventuality. Therefore, it would be opportune for the doctors to support the use of on-line notification which benefits both doctors as well as MOH in enabling prompt and appropriate public health response.


LEARNING POINTS

- **Notifications of infectious diseases is an important strategy allowing MOH to monitor and detect occurrences of infectious diseases.**
 - **For regular updates of local and regional outbreak situations which are constantly evolving, medical practitioners can even log on to the online Communicable Diseases Live & ENhanced Surveillance (CDLENS) programme.**
 - **For CDLENS, medical practitioners will have to log on with their Singapore Medical Council (SMC) assigned ID and password, or their own Singpass.**
-

ANNEX A

MOH weekly publication of statistics on local infectious disease situation

Available online at <http://www.moh.gov.sg/mohcorp/statisticsweeklybulletins.aspx>



MINISTRY OF HEALTH
SINGAPORE

VOL. 7 NO.41 2010

<http://www.moh.gov.sg/mohcorp/statisticsweeklybulletins.aspx>
Published by the Communicable Diseases Division

WEEKLY INFECTIOUS DISEASE BULLETIN
EPIDEMIOLOGICAL WEEK 41 10 - 16 Oct 2010

	E Week 41			Cumulative first 41 Weeks		
	2010	2009	Median 2005-2009	2010	2009	Median 2005-2009
FOOD/WATER-BORNE DISEASES						
Campylobacteriosis	7	11	6	265	210	167
Cholera	0	0	0	1	3	1
Paratyphoid	3	0	1	34	23	20
Polymyelitis	0	0	0	0	0	0
Salmonellosis (non-enteric fevers)	33	24	9	1229	886	306
Typhoid	0	3	1	63	56	58
Viral Hepatitis A	0	0	2	40	72	72
Viral Hepatitis E	0	0	0	95	76	33
VECTOR-BORNE DISEASES						
Chikungunya Fever	1	4	NA	26	314	NA
Dengue Fever	147	54	154	4212	3702	4960
Dengue Haemorrhagic Fever	0	0	1	32	42	67
Malaria	2	2	2	158	151	136
Nipah virus infection	0	0	0	0	0	0
Plague	0	0	0	0	0	0
Yellow Fever	0	0	0	0	0	0
AIR/DROPLET-BORNE DISEASES						
Avian Influenza	0	0	0	0	0	0
Diphtheria	0	0	0	0	0	0
Encephalitis	2	1	1	24	34	31
Haemophilus Influenzae B infection	0	0	0	4	3	3
Hand, Foot And Mouth Disease	710	391	391	26725	12623	13513
Legionellosis	0	1	0	19	18	18
Measles	1	0	0	43	0	16
Melioidosis	0	2	2	53	26	52
Meningococcal Disease	0	0	0	6	1	1
Mumps	6	9	20	367	552	656
Pertussis	0	0	0	4	12	19
Pneumococcal Disease (invasive)	2	2	NA	231	202	NA
Rubella	0	3	2	143	135	115
Severe acute respiratory syndrome	0	0	0	0	0	0
OTHER DISEASES						
Viral hepatitis B	1	2	2	48	54	59
Viral hepatitis C	8	0	0	12	3	12
POLYCLINIC ATTENDANCES						
Acute upper respiratory infections	13413	11904	11504	607520	502130	520137
Acute conjunctivitis	541	383	568	21033	19023	26961
Acute Diarrhoea	2349	2151	2151	91272	87036	87596
HIV/STI/TB NOTIFICATIONS*						
HIV/AIDS	2010	Sep		Cumulative 2010		
Legally Notifiable STIs**	49			335		
Tuberculosis	504			5070		
	123			1194		

MOH Epidemiological News Bulletin (quarterly)

Available on-line at: <http://www.moh.gov.sg/mohcorp/publicationsnewsbulletins.aspx>



Epidemiological News Bulletin
QUARTERLY

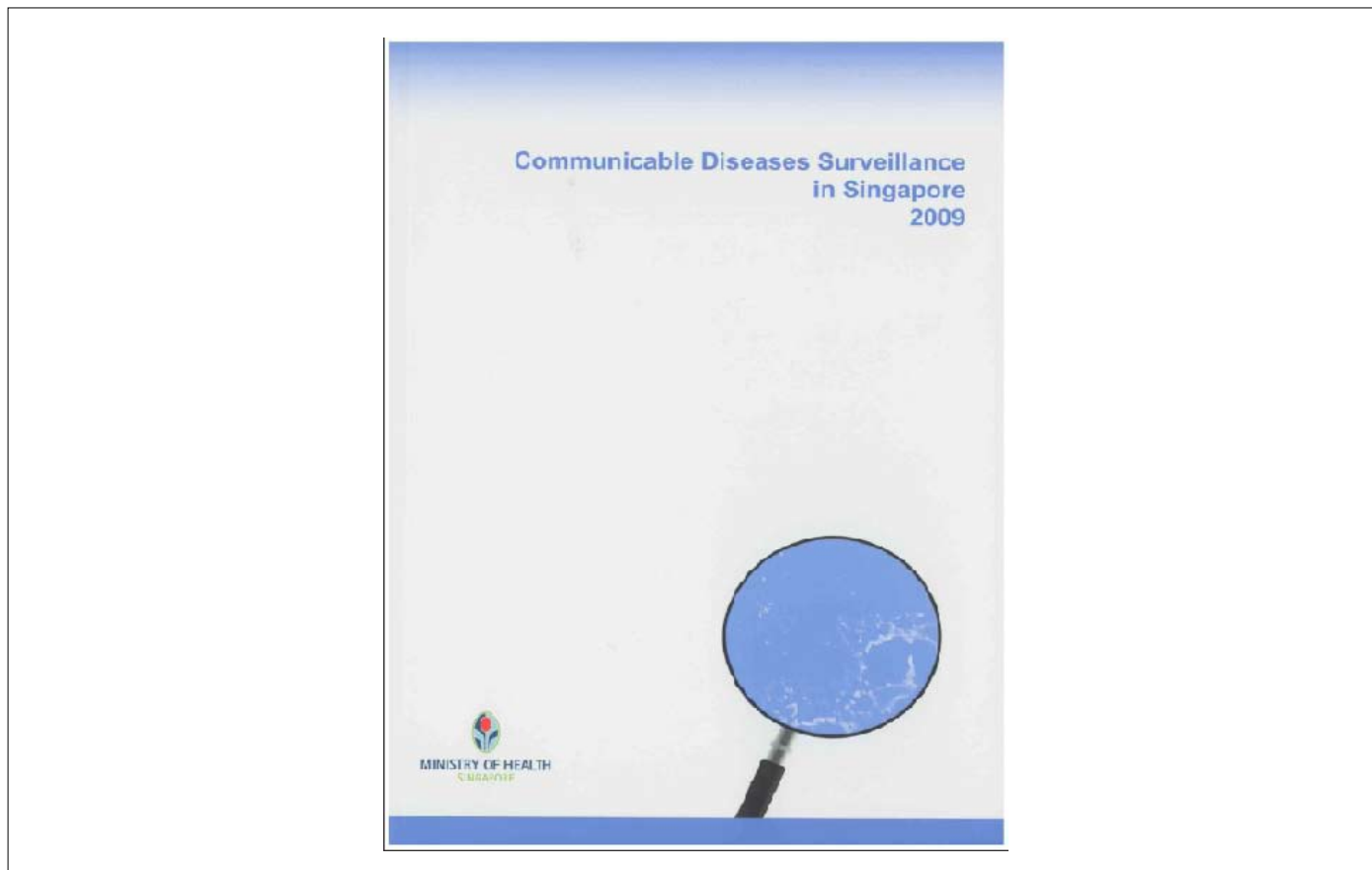
36th year of publication

SEPTEMBER 2010 VOL. 36 NO. 3

A PUBLICATION OF THE MINISTRY OF HEALTH, SINGAPORE

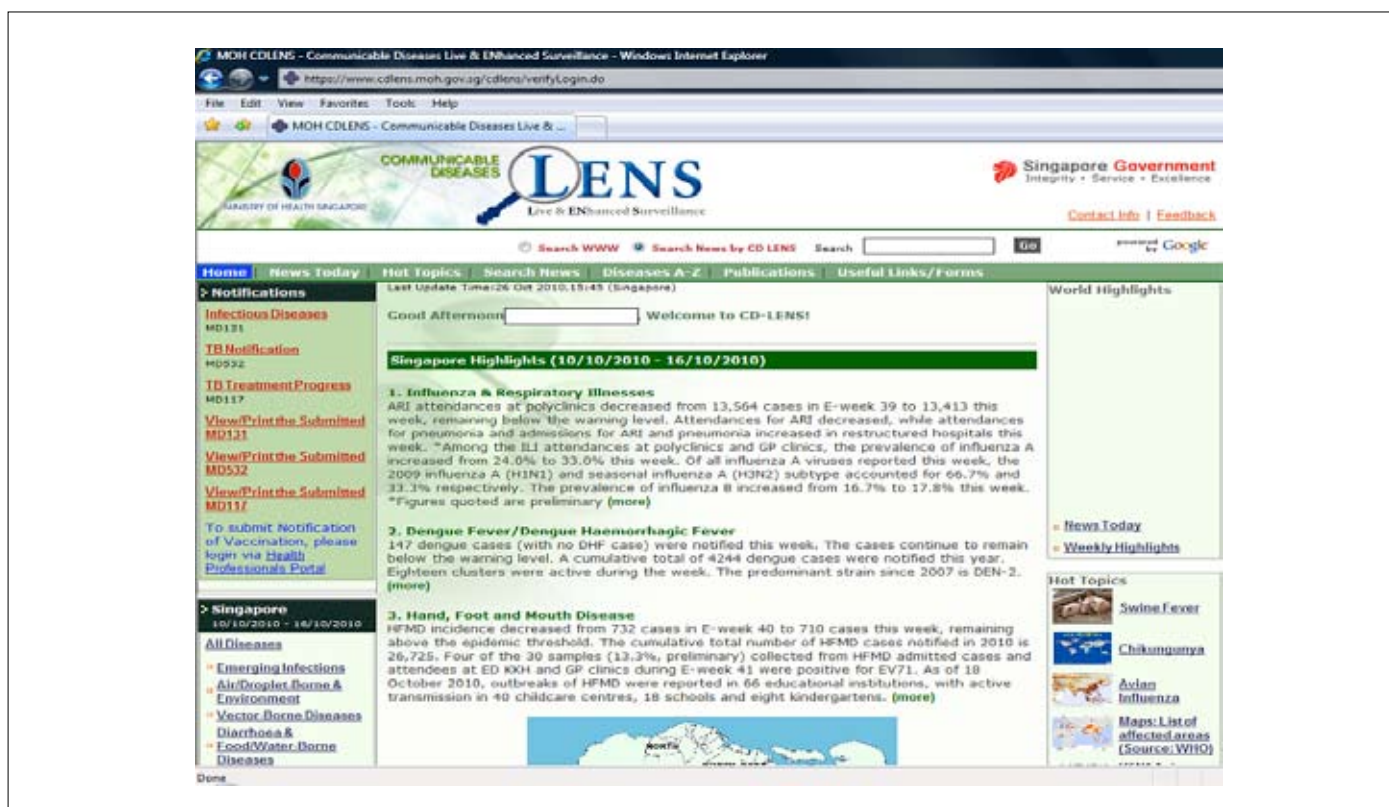
MOH Communicable Diseases Surveillance Report (annual)

Available online at: <http://www.moh.gov.sg/mohcorp/publicationsreports.aspx>



MOH Communicable Diseases Live & Enhanced Surveillance (CDLENS)

<http://www.cdLens.moh.gov.sg/cdLens>



FAQs

1. How can I go about setting up internet access in my clinic?

If the doctor requires assistance in obtaining the necessary equipment and internet service for his clinic, he can provide his name and contact details to moh_ens@moh.gov.sg, call 1800-3258451 or complete the following enquiry form to be faxed to 62215538 before June 2011 and MOH would put him in touch with a vendor.

Alternatively, the doctor may explore the IT market to make purchases from vendors who can offer the best deals in town.

IT Enquiry Form for General Practitioners

(To be faxed before June 2011)

Date : _____

Communicable Diseases Division

Ministry of Health

I would like to seek MOH's assistance in getting me in touch with a vendor to obtain the necessary equipment and internet service for my clinic.

Name of Doctor : _____

Name of Clinic : _____

Clinic Address : _____

Clinic telephone number : _____

Handphone number : _____

Please fax the completed form to 62215538 or email us at moh_ens@moh.gov.sg or call us at 1800 - 3258451.

2. It is much more expensive to subscribe to internet service commercially than personally to make the notification on-line. Is there a solution to address this?

Personal mobile broadband services are currently available at affordable rates. Doctors may wish to consider subscribing to such services for making notification online. There is no restriction on the use of personal broadband in the clinic environment.

3. Has MOH developed any electronic clinic management system through which notification of infectious diseases can be integrated and thus making the workflow process more streamlined?

MOH has not developed any such clinic management system. However, there are 2 Clinic Management System (CMS) currently available from 2 private companies: Crimson-Logic and Frontline. GPs could use this system for the day-to-day running of their clinics, and as an added advantage, the system also has the ability to directly interface with CDLENs, CDMP (chronic diseases management programme) and NIR (National Immunization Registry), thus making it more convenient for GPs to notify MOH of infectious diseases and HPB of vaccinations etc, via the internet. You can obtain further information on the CMSs by writing to:

Jeffrey Lee, CrimsonLogic Pte Ltd
jeffreylee@crimsonlogic.com
HP: 96933258

Ms Christina Tan, Frontline Solutions Pte Ltd
christina.tan@bt.com
HP: 81008810

COMMUNICABLE DISEASES LIVE AND ENHANCED SURVEILLANCE SYSTEM (CD-LENS) AND THE HEALTH PROFESSIONALS PORTAL (HPP)

Contributed by Communicable Diseases Division, Ministry of Health

ABSTRACT

The outbreak of the Severe Acute Respiratory Syndrome (SARS) in 2003 revealed the need to strengthen Singapore's public health surveillance system, in providing early warning of disease outbreaks in other countries, and identifying unusual trends in infectious diseases and disease syndromes in our population. Enhancing our medical surveillance capabilities would enable us to be better prepared, and more able to respond to outbreaks and the potential importation of diseases into Singapore. On 15 July 2006, the Communicable Diseases Live & ENhanced Surveillance (CDLENS) system was launched. CDLENS was developed as part of the ongoing enhancements of our public health surveillance capabilities. As a one-stop internet portal, it can be accessed anytime, anywhere, for real-time information on infectious disease news.

SFP2011; 37(2): 18-20

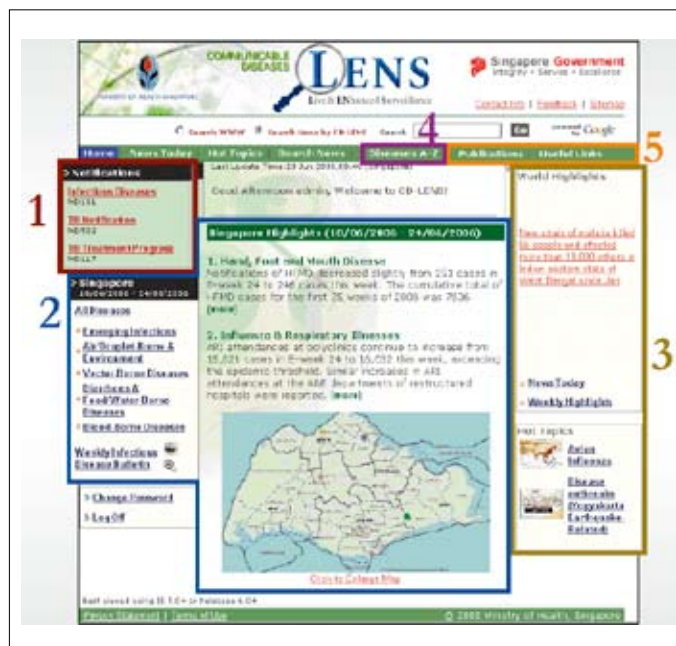
INTRODUCTION

On 15 July 2006, the Communicable Diseases Live & ENhanced Surveillance (CDLENS) system was launched. The previous Electronic Notification System (ENS) had been integrated with CDLENS, which is a one-stop Internet portal developed for infectious diseases notification and outbreak management, as well as real-time information access to local and global infectious diseases events.

CDLENS was developed as part of the ongoing enhancements of our public health surveillance capabilities. As a one-stop internet portal, it can be accessed anytime, anywhere, for real-time information on infectious disease news. In CDLENS, on-line notification of infectious diseases has also been simplified and made much more convenient. Through established interfaces with other databases, residential, workplace or institutional addresses would be auto-populated into the notification form, just by keying in the postal code or name of school, childcare centre, kindergarten or building.

Functions of CDLENS

CDLENS can be accessed via direct URL at www.cdLens.moh.gov.sg, or through the Health Professionals Portal (HPP) at www.hpp.moh.gov.sg. More information on the functions of the HPP will be discussed later in the chapter. Medical practitioners can login to CDLENS (or HPP) using their MCR number as 'user name', and their SMC-CME password as 'password'. Medical practitioners who do not have an SMC-



CME password can call the CME hotline at 6355-2458 or email to SMC at moh_smc@moh.gov.sg to obtain the password. Alternatively, medical practitioners can also login with their individual Singpass ID and password.

1. Infectious Disease Notification

Online notification of infectious diseases has been incorporated in CDLENS and greatly enhanced for prompt and easy notification. Further details on the 4 steps to online notification will be discussed later in the chapter.

2. Singapore Highlights

The latest information on infectious disease incidence and trends in Singapore is available in this section.

3. World Highlights and News Today

Real-time information on outbreak alerts and infectious disease news from around the world are available in this section.

4. Diseases A – Z

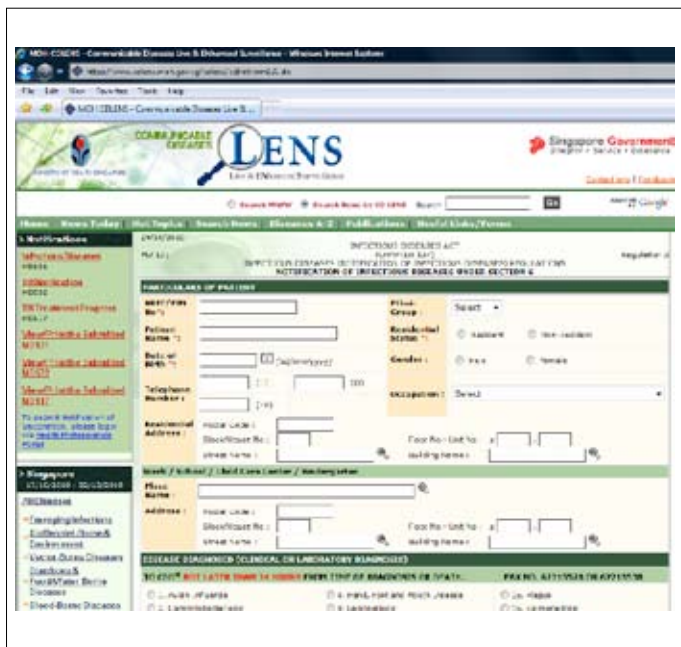
Clinical and epidemiological information on key infectious diseases arranged in alphabetical order is available for medical practitioners' quick and easy reference.

5. Publications and Useful Links

Hyperlinks to MOH publications on infectious diseases, as well as websites of international and national public health organisations, is provided in this section for the convenience of users.

Infectious Disease Notification in 4 Easy Steps

1. Log on to www.cdLens.moh.gov.sg with your MCR number and SMC-CME password.
2. Select the notification form to use:
 - MD 131 – Notification of infectious diseases
 - MD 532 – Notification of Tuberculosis (TB)
 - MD 117 – Update of TB treatment progress
3. Complete the relevant form:
 - Key in patient’s NRIC/FIN/Passport number and his/her residential address will be automatically indicated.
 - Key in 6-digit postal code of residential or workplace address and the full address will be auto-populated. Complete the unit number if necessary.
 - Select name of school, childcare centre or kindergarten which has been arranged in alphabetical order, and the full address will be auto-populated.
 - Use calendar for date of diagnosis and date of onset of illness.
 - Notify promptly, within the timeframe prescribed in the Infectious Diseases Act.
4. Click “Submit”.



Healthcare Professionals Portal (HPP)

The HPP is accessible at www.hpp.moh.gov.sg. With a single user identification and password, it allows doctors to access a repository of updates, circulars on pertinent public health issues, MOH MedAlerts and HSA Drug Alerts.

Several electronic services are also available in HPP:

- CDLENS – In addition to notification of infectious diseases, a repository of infectious diseases surveillance updates can be accessed.
- National Immunisation Registry – This allows doctors to access patient vaccination records, and notify the National Immunisation Registry of vaccinations administered.
- Electronic License Application – Licenses for clinics can be applied and renewed.
- Health Check System – Used to track prescription for Tamiflu during the H1N1-2009 influenza pandemic, and is required for accreditation of the PPC.
- National Registry of Diseases System – This is a system comprising diseases registries, namely cancer, cardiac, renal and stroke. Information gathered from these registries of public health importance guide planning and policy-making.
- Postgraduate Training Management System – This is an on-line training log book which records the training and clinical exposure acquired by specialist trainees.
- Reporting of Adverse Events related to Health Products – Medical practitioners may submit reports of adverse events related to health products. This is part of Health Science Authority’s post-marketing health product safety surveillance system.
- SMC Online System – Doctors can submit credit claims for CME, access CME calendars, in addition to other professional services.
- Notifications of Occupational and Work-related Diseases – Medical practitioners can also access the link to the Ministry of Manpower’s on-line system for notifications of occupational and work-related diseases through the portal.



CONCLUSION

With international air travel becoming increasingly common, the rapid spread of infectious diseases across borders has become a very real and serious threat. There is, therefore, a need for an online surveillance system through which medical practitioners can submit timely notifications of infectious diseases, as well as access real-time information on global and local infectious disease situations anywhere and at anytime. CDLENS sets out to achieve exactly that.

In addition, the roles and functions of the medical practitioner are also rapidly evolving and expanding. Going beyond the traditional diagnosis and treatment of diseases, the

doctors of today are also responsible for many additional tasks, like notification of immunisations, notification of occupational diseases, notification of adverse drug reactions, just to name a few. As such, a comprehensive one-stop portal for all medical e-services like HPP, which also serves as a repository for timely updates on public health issues, would be essential to all medical practitioners. Therefore, moving forward, MOH would be continuing to partner with the Singapore Medical Association (SMA) and College of Family Physicians Singapore (CFPS) to publicize the HPP and to provide information to doctors on use of the e-Services.

LEARNING POINTS

- **CDLENS was developed as part of the ongoing enhancements of our public health surveillance capabilities.**
 - **CDLENS can be accessed via direct URL at www.cdLens.moh.gov.sg**
 - **Online notification of infectious diseases has been incorporated in CDLENS and greatly enhanced for prompt and easy notification.**
 - **The Healthcare Professionals Portal (HPP) is accessible at www.hpp.moh.gov.sg. With a single user identification and password, it allows doctors to access a repository of updates, circulars on pertinent public health issues, MOH MedAlerts and HSA Drug Alerts.**
-

UNIT NO. 3B

CLINICAL MANAGEMENT SYSTEM

Contributed by CrimsonLogic Pte Ltd

ABSTRACT

An efficient clinic management system (CMS) is not only a patient-centric system which helps to improve patient care, but also integrates seamlessly with your daily operational needs. Ensuring tight security and using functionality standards, the CMS is able to maintain a patient's complete profile like his Electronic Medical Record (EMR), billing and claims, and submit disease notifications to respective healthcare authorities.

SFP2011; 37(2): 21-24

INTRODUCTION

A significant number of health professionals are still completing the MD131 form manually and faxing to MOH. You might say "This is an easy task. No trouble at all!" We thank you for your effort to make Singapore a safe environment to live in. But why should you spend the extra time to keep track of the physical forms when it's just a few mouse-clicks to prepare and submit on-line?

The following are a list of comparison that highlights the differences in terms of efficiency and security between the two processes:

Hardcopy Form (Fax Submission)

Need clarification on the format of the physical form.

Potential compromise of patient confidentiality

Repeated entry for similar information.

Have to check the fax numbers for the right authority to fax the form to.

Misplacement of forms.

Have to remember if you have faxed the notification form within the required time frame.

Have to file the forms manually. Waste of storage space in the clinic and difficulty in tracking.

Hand-written information is not legible at the data entry.

- Personnel will call Informant to clarify the information. This causes unnecessary follow-up action.

Need to print physical form to fill up.

- Printer and printing paper required.

CMS (Electronic Submission)

Simple user interface is able to provide a guide on the required information which you need to fill in.

Patient confidentiality ensured:

- Only authorised Doctor's access is able to do the submission.
- Patient's contact is not exposed especially for confidential cases like AIDS/HIV.

Auto-populated data shortens entry time and prevents errors:

- Key in the postage code and the rest of the address fields will be auto populated.
- Particulars of the login ID will be auto-populated in the Informant particulars fields.

Form is automatically submitted to the right authorities as per your indication.

Systematically tracking:

- You are able to create a form for a particular patient and keep the form in the submission queue for later update.
- Prevents losing the form and exposing patient data.

Alert notifications will be prompted if there are forms pending submission.

Ease of use:

- Easy tracing of past submitted forms.
- Clear view of cases pending submission.
- No physical storage space issue.

Information submitted on-line are clearly identified and stored. Follow-up calls would be more of gathering more information on the notified case, instead of verifying clarity of the data.

Environmental friendly:

- No printing is required. All required particulars can be found on-line and submit digitally.
- Can be done, anytime and anywhere!

DOING E-FILING

It's as simple as A-B-C!

CrimsonLogic's healthcare solution – ClinicWeaver, not only seamlessly integrates the daily clinic operation for efficient workflow, it also helps to manage the e-filing of government claims submissions (e.g. Medisave) and infectious disease notifications (MD131).

The following are the steps to show the convenience of using ClinicWeaver to submit MD131 electronically:

Step 1: Patient registration and consultation

Patient's information is recorded by Clinic Assistant during registration using the Administration module. Consultation notes and diagnoses codes are captured by the practitioner in the ClinicWeaver Consultation module.

Diagnosis	Diagnosis Group	L	Status	Type
051 - INFECT.D15 - Dengue	PCPS(D09)	<input type="checkbox"/>	Final	Primary

Step 2: Submit MD131 notification

Practitioner is able to prepare the MD131 notification form during the consultation. Select Govt Submissions > MD131 from the menu. The MD131 notification form will appear.

Step 3: Check patient's particular

Patient's particulars for the current consultation will be auto-populated to the respective fields. Only the information provided by Patient during registration will be shown. Ensure all the particulars are correct and fill up any missing information.

**INFECTIOUS DISEASES ACT
(CHAPTER 137)**

MD 131 Regulation 2

**INFECTIOUS DISEASES (NOTIFICATION OF INFECTIOUS DISEASES) REGULATIONS
NOTIFICATION OF INFECTIOUS DISEASES UNDER SECTION 6**

[PATIENT PARTICULARS](#) | [DISEASE DIAGNOSED](#) | [TRAVEL HISTORY OVER THE PAST ONE MONTH](#) | [PARTICULARS OF INFORMANT](#)

*Indicates mandatory field.

PARTICULARS OF PATIENT

NRIC/FIN/Passport NO *: S0001234C Ethnic Group : Chinese

Patient Name* : EBONY Residential Status* : Resident Non-Resident

Date of Birth* : 24-01-1983 (DD/MM/YYYY) Gender : Female

Telephone Number : (H) (O) Occupation :

Address: Postal Code: 117611 Floor No - Unit No : # -

Block/House No : 31 Building Name : CRIMSON, THE

Street Name : SCIENCE PARK ROAD

Work / School / Child Care Center / Kindergarten

Place Name:

Address: Postal Code:

Block/House No : Floor No - Unit No : # -

Street Name: Building Name :

Step 4: Select the disease diagnosed

Select the disease diagnose, the dates of diagnosis made and date of onset of illness. Input patient's travel history if you have the information.

3.Chikungunya Fever 10.Malaria 17.SARS

4.Cholera 11.Melioidosis 18.Typhoid

5.Dengue Fever 12.Meningococcal Disease 19.Yellow fever

6.Dengue Haemorrhagic Fever 13.Nipah Virus Infection ~20.Others (Specify)

7.Encephalitis, Viral 14.Paratyphoid

~ For any disease not appearing in this form, which may be of an infectious nature and result in an epidemic. If name of disease is not known, please specify symptoms.

TO CDD* NOT LATER THAN 72 HOURS FROM TIME OF DIAGNOSIS. FAX NO. 62215528 OR 62215538

#21.Diphtheria 25.Hepatitis C, acute #29.Pertussis

#22.Haemophilus influenzae type b (Hib) Disease 26.Hepatitis E, acute #30.Pneumococcal Disease (invasive)

#23.Hepatitis A, acute #27.Measles #31.Poliomyelitis

#24.Hepatitis B, acute #28.Mumps #32.Rubella

For notifiable diseases marked #, please provide vaccination history :

Yes - If yes, Date of vaccination (dd/mm/yyyy) - - - No

TO NPDU~ NOT LATER THAN 72 HOURS FROM TIME OF DIAGNOSIS. FAX NO. 62541616

33.AIDS 34.HIV Infection (non-AIDS)

TO TBCU % NOT LATER THAN 72 HOURS FROM TIME OF DIAGNOSIS. FAX NO. 62524051

** For tuberculosis, please use Notification of Tuberculosis Form (MD532) to notify TBCU.

TO NSC^ NOT LATER THAN 72 HOURS FROM TIME OF DIAGNOSIS. FAX NO. 62994335

*35.Chlamydia Genital Infection *38.Non-Infectious Syphilis (tertiary) *41.Genital Herpes (first episode)

*36.Gonorrhoea *39.Infectious Syphilis (primary) *42.Genital Herpes (recurrent)

*37.Non-Gonococcal Urethritis *39.Infectious Syphilis (secondary) 43.Leprosy

*38.Non-infectious Syphilis (latent) *40.Congenital Syphilis

* For sexually transmitted infections marked *, full name, NRIC/Passport No./FIN, address and telephone number need not be completed. Initials of the patient should be given.

Date present diagnosis was made/ suspected: * 15 - Dec - 2010 (DD-MMM-YYYY) Diagnosis: * Clinical Confirmed by laboratory tests

(For laboratory notification, please provide the date of test of positive sample)

Date of Onset of Illness: * 15 - Dec - 2010 (DD-MMM-YYYY) Follow-up of patient: Others (specify)

(dd/mm/yyyy for laboratory notification, please provide the date of receipt of sample)

[PATIENT PARTICULARS](#) | [DISEASE DIAGNOSED](#) | [TRAVEL HISTORY OVER THE PAST ONE MONTH](#) | [PARTICULARS OF INFORMANT](#)


TRAVEL HISTORY OVER THE PAST ONE MONTH:

Countries visited:

From: - - (DD-MMM-YYYY) To: - - (DD-MMM-YYYY)

Step 5: Check informant particulars

Registered practitioner's particulars will auto-populated into this column. Ensure the data are updated for submission.

PARTICULARS OF INFORMANT	
Particulars of Medical Practitioner/Scientist	
MCR Number *:	00045J
Name *:	<input type="text" value="DR LING"/>
Telephone Number :	<input type="text" value="64555555"/>
E-mail Address :	<input type="text"/>
Particulars of Medical Institution	
Place Name*:	<input type="text" value="HEAL YOUR SOUL"/>
Address:	Postal Code: <input type="text"/> 
	Block/ House No : <input type="text"/> Floor No - Unit No : # <input type="text"/> - <input type="text"/>
	Street Name: <input type="text"/> Building Name : <input type="text"/>

Step 6: Additional comments and submit

Enter additional information in the COMMENTS field provided. Check through the online form and click the Submit button to submit the notification. You can choose to save the form and submit at a later date (as long as within the notification period) if you need to conduct further verification.

COMMENTS
<input style="width: 100%; height: 40px;" type="text"/>
<input type="button" value="Submit"/> <input type="button" value="Submit Later"/> <input type="button" value="Print"/> <input type="button" value="Cancel"/>

LEARNING POINTS

- **The CMS is able to maintain a patient's complete profile like the Electronic Medical Record (EMR), billing and claims, and submit disease notifications to respective healthcare authorities.**
 - **Information submitted on-line are clearly identified and stored. Follow-up calls would be more of gathering more information on the notified case, instead of verifying clarity of the data.**
 - **Patient's information is recorded by Clinic Assistant during registration using the Administration module. Consultation notes and diagnoses codes are captured by the practitioner in the ClinicWeaver Consultation module.**
 - **Patient's particulars for the current consultation will be auto-populated to the respective fields.**
-

UNIT NO. 4

REPORTING OF OCCUPATIONAL DISEASES IN SINGAPORE

Dr Kenneth Choy, Alvia Tan Xingyong, Lee Chin Soon, Ong Peh Woon

ABSTRACT

Doctors play a critical role in the early recognition and reporting of occupational diseases. Singapore, like most countries, imposes a statutory requirement for the mandatory reporting of occupational diseases where the responsibility for notification to the Ministry of Manpower (MOM) rests with the employer and the physician who makes the diagnosis of an occupational disease. The list of 31 reportable occupational diseases is prescribed in the Workplace Safety and Health Act. A robust reporting system enables Singapore to identify and monitor persons at high risk so as to prevent occupational diseases. Timely reporting will also facilitate the compensation of workers with occupational diseases under the Work Injury Compensation Act.

SFP2011; 37(2): 25-30

INTRODUCTION

Occupational diseases (ODs) occur as a result of exposure to physical, chemical, biological, ergonomic or psychosocial factors in the workplace. Common occupational diseases include occupational skin disorders, work-related musculoskeletal disorders, noise-induced hearing loss, heavy metal poisonings, solvent intoxications, heat disorders, occupational asthmas and certain cancers (see Table 1 for the type and number of cases confirmed from 2000 to 2009).

Workers employed in occupations with exposure to certain hazards (Table 2) are required under the Workplace Safety and Health (Medical Examinations) Regulations to undergo specific medical examinations¹. The medical examinations and tests help to detect workers with occupational disease or overexposure early, and ensure that workers remain fit for such work. These medical examinations are conducted by Designated Workplace Doctors (DWDs) registered with MOM. Almost all the cases of noise induced deafness and excessive absorption of chemicals are detected as a result of these regular medical examinations.

Table 1. Confirmed chronic occupational diseases in Singapore, 2000 - 2009

Type of Disease	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
TOTAL	527	546	504	495	380	517	657	602	855	468
Noise Induced Deafness	366	359	339	300	251	391	535	490	743	380
a) Early	354	345	323	294	247	384	527	485	741	375
b) Compensable	12	14	16	6	4	7	8	5	2	5
Occupational Skin Diseases	93	118	99	67	81	84	89	59	66	56
Excessive Absorption of Chemicals	22	36	12	20	6	24	5	3	11	16
Chemical Poisoning	1	-	11	-	-	-	-	-	8	-
Barotrauma	28	-	10	8	6	5	5	17	5	1
Compressed Air Illness	1	-	20	8	4	5	3	2	7	-
Occupational Lung Disease ¹	5	8	3	1	2	4	2	3	5	3
Work-related Musculoskeletal Disorders	3	3	6	10	7	3	8	25	5	3
Others	8	22	4	81 ^a	23 ^b	1	10	3	5	9

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Table 2
Prescribed Hazards Requiring Medical Examinations under the Workplace Safety and Health (Medical Examinations) Regulations

- | | |
|---|-------------------------------|
| 1. Arsenic & its compounds | 10. Manganese & its compounds |
| 2. Asbestos | 11. Mercury & its compounds |
| 3. Any occupation or process carried out using compressed air | 12. Organophosphates |
| 4. Benzene | 13. Perchloroethylene |
| 5. Bitumen | 14. Pitch |
| 6. Cadmium & its compounds | 15. Raw cotton |
| 7. Creosote | 16. Silica |
| 8. Excessive noise | 17. Tar |
| 9. Lead & its compounds | 18. Trichloroethylene |
| | 19. Vinyl chloride monomer |

Statutory duty to notify occupational diseases

In Singapore, the reporting of workplace accidents and occupational diseases is a legal requirement under the Workplace Safety and Health (Incident Reporting) Regulations. All workplaces are covered under these Regulations and employers have to report work-related deaths, injuries, dangerous occurrences and occupational diseases to MOM. All

registered medical practitioners are required to report any of the occupational diseases listed in the Workplace Safety and Health Act² to MOM within 10 days from the diagnosis of the disease (Tables 3 and 4). Doctors should also inform employers of the diagnosis to enable employers to comply with their statutory duty to notify occupational diseases to MOM. It is an offence to fail to make an incident report as required by the law*.

Table 3. Overview of reporting requirements under the WSH (Incident Reporting) Regulations

What to Report?	Who to Report?	What Needs to be Done?
A workplace accident that causes the death of an employee.	The employer of the deceased worker.	Notify the Commissioner immediately via phone or fax. AND Submit the incident report within 10 days of the accident via iReport.
A workplace accident that causes injury to an employee, who is then: Given more than three consecutive days of medical leave; or hospitalised for at least 24 hours.	The employer of the injured worker.	Submit the incident report within 10 days of the accident via iReport. If the employee subsequently dies from the injury, the employer must notify the Commissioner as soon as he/she knows of the employee's death.
A workplace accident that involves a self-employed person or member of public, causing him/her to die or sent to hospital for treatment of injury.	The workplace occupier.	Notify the Commissioner immediately via phone or fax. AND Submit the incident report within 10 days of the accident.
A dangerous occurrence.	The workplace occupier.	Notify the Commissioner immediately via phone or fax. AND Submit the incident report within 10 days of the incident via iReport.
An occupational disease.	The doctor who diagnosed the disease; and The employer of the person with the disease.	Submit the incident report within 10 days of diagnosis (Doctor) via iReport. Submit the incident report within 10 days of receiving the written diagnosis (Employer) via iReport.

Note: Employers or occupiers who reported a workplace incident are also required to keep records of the incident for at least 3 years.

Table 4. List of Reportable Occupational Diseases in Singapore

1. Aniline poisoning	16. Hydrogen Sulphide poisoning
2. Anthrax	17. Occupational skin diseases
3. Arsenical poisoning	18. Lead poisoning
4. Asbestosis	19. Liver angiosarcoma
5. Barotrauma	20. Manganese poisoning
6. Beryllium poisoning	21. Mercurial poisoning
7. Byssinosis	22. Mesothelioma
8. Cadmium poisoning	23. Noise-induced deafness
9. Carbamate poisoning	24. Occupational asthma
10. Carbon Bisulphide poisoning	25. Organophosphate poisoning
11. Chrome ulceration	26. Phosphorous poisoning
12. Chronic benzene poisoning	27. Poisoning from halogen derivatives of hydrocarbon compounds
13. Compressed air illness	28. Repetitive strain disorder of the upper limb
14. Cyanide poisoning	29. Silicosis
15. Epitheliomatous ulceration (due to tar, pitch, bitumen, mineral oil or paraffin or any compound, product or residue of any such substance)	30. Toxic anaemia
	31. Toxic hepatitis

* Non-compliance with the incident reporting requirements can be penalised with a fine up to \$5,000 for first offence, and a fine of up to \$10,000 or/and an imprisonment up to 6 months for a second or subsequent offence.

Purpose of reporting

A robust notification system for occupational accidents and diseases is necessary to ensure reliable data collection for an understanding of the extent and depth of the occupational safety and health (OSH) issues in the country. The notification, analysis of OSH statistics are integral parts of any national policy and system for OSH. It helps the authorities to identify persons and industries at risk to better manage established workplace hazards, as well as to identify new and emerging ones.

The reporting of occupational accidents and diseases allows investigations to be conducted to establish causality and active case finding to identify others who may also be at risk. It allows for institution of appropriate preventive measures and the monitoring of trends and early identification of emerging concerns. Furthermore, accurate and timely reporting will enable injured workers to exercise their rights to claim compensation and ensure that their claims can be processed expeditiously.

MOM's electronic reporting system – iReport

Introduced in March 2006, the ‘iReport’ is a national electronic reporting system, accessible at www.mom.gov.sg/ireport/. It is a convenient one-stop system for the reporting of work-related deaths, injuries, dangerous occurrences and occupational diseases for employers, occupiers and doctors. The key features of iReport are listed in Figure 1.

Figure 1. Key Features of iReport

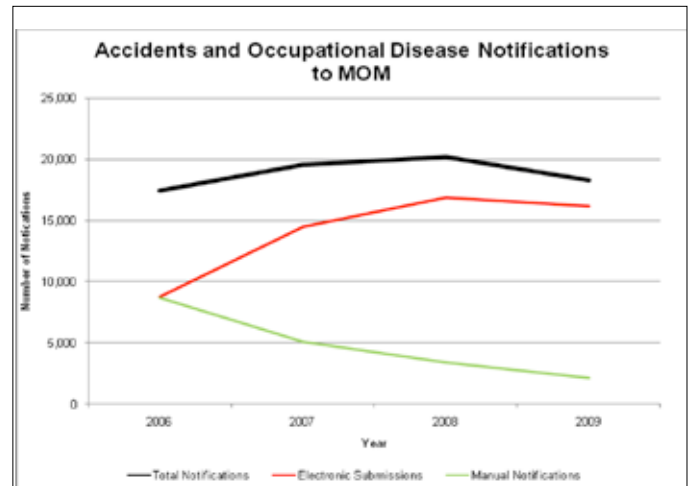
iReport

- One-stop reporting platform for occupational accidents, injuries and diseases
- Ease of submission – electronic rather than hardcopy
- User-friendly platform
- Allows SMS and email acknowledgement
- Platform to report all incidents in workplaces whether covered by WSH Act or not.

Since its launch, the system has been enhanced and it now allows victims to report their own accidents or appoint representatives to file an incident notification and for doctors to also report workplace injuries (even though this is not a statutory duty). Employees or members of the public can also file a notification on a workplace incident or an unsafe act. The proportion of submissions sent through electronic means has increased from about 50% in 2006 to more than 90% in 2009 (see Figure 2).

Doctors are also able to assess the iReport through the Health Professionals Portal (HPP) at www.hpp.moh.gov.sg.

Figure 2. Trends of accidents and occupational disease notification to MOM

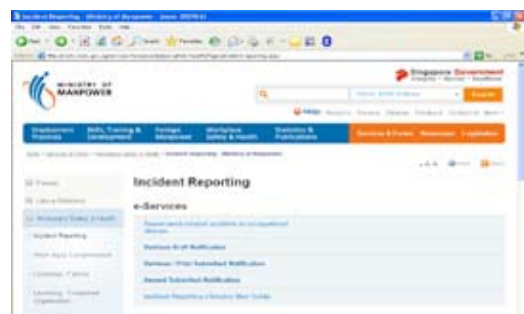


1st March 2006: WSH(IR) Reg requires notifications and accident reports to be filed under iReport system
 1st April 2008: WICA Reg requires notifications and accident reports to be filed under iReport system
 Feb 2010: Launch of enhanced iReport system. All hardcopy forms were removed from MOM website

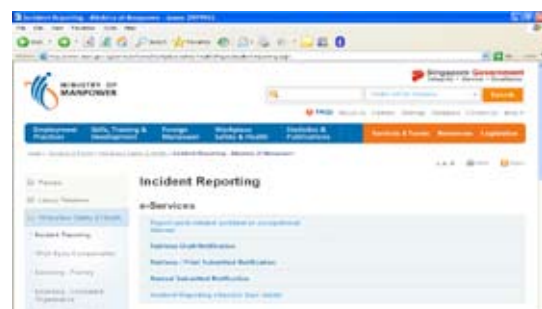
Figure 3. Step-by-step guide to use of i-Report – the Incident Reporting Process

Notes: For more information, refer to User Manual, Incident reporting (e-Service) at <http://www.mom.gov.sg/Documents/services-forms/Safety%20and%20Health/IR%20Services%20User%20Guide.pdf>

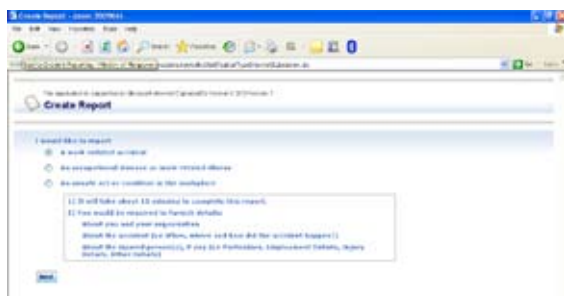
Step 1: Go to Incident reporting e-Services webpage <http://www.mom.gov.sg/services-forms/workplace-safety-health/Pages/incident-reporting.aspx>



Step 2: Click “report work-related accident or occupational disease”



Step 3: Select an accident to report from the given categories



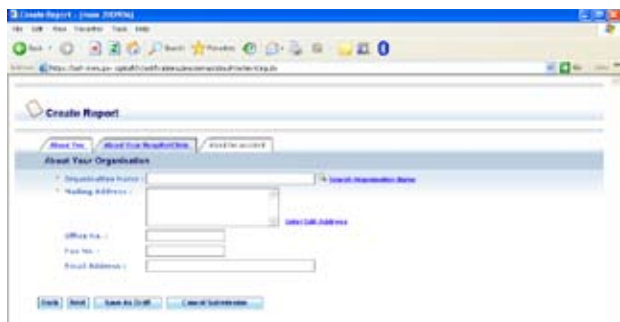
Step 4: Click “next”



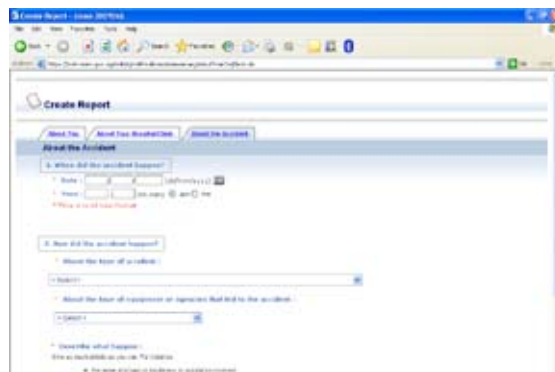
Step 5: Fill in all required particulars marked *



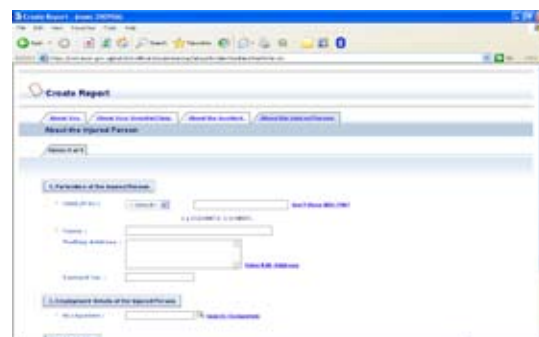
Step 6: Fill in all required information marked *. Click “next”



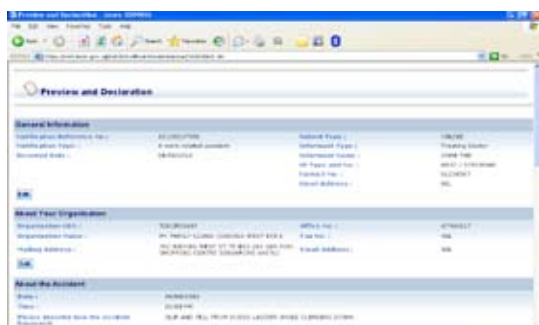
Step 7: Fill in all required information about the accident marked *



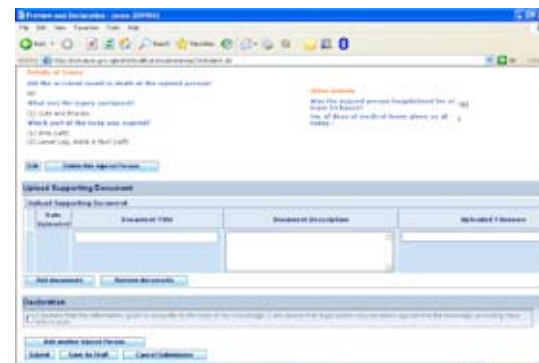
Step 8: Fill in all required information about the injured person



Step 9: Check to ensure all information are accurate



Step 10: Click “submit” at end of report



Diagnosing an occupational disease

The diagnosis and investigation of occupational diseases often requires detailed occupational histories, specialized tests and workplace visits to be conducted. Early detection is important in the prevention of occupational disease as control measures can be instituted sooner for the protection of the affected worker as well as other workers.

Workers with suspected or confirmed occupational or work-related disease may be referred to one of the occupational health clinics (Table 5) where they are seen by occupational physicians and specialists in the relevant disciplines. The clinic will assist in the confirmation of the diagnosis, manage the effects and complications from the workplace exposure, conduct workplace assessments where indicated, and provide recommendations on preventive measures to employer and worker so as to prevent recurrence.

MOM will be publishing a quick reference guide on occupational diseases for the diagnosis and management of work-related conditions in a clinical setting.

Table 5

Suspected medical condition	Occupational Health	Contact No.
Any work-related illness	Occupational Health Clinic Hougang Polyclinic	6355 3000
Any work-related illness	Occupational Health Clinic Geylang Polyclinic	6842 2440
Any work-related illness	Occupational Medicine Specialist Clinic Jurong Polyclinic	6355 3000
Occupational skin disease	Occupational Dermatoses Clinic National Skin Centre	6350 6666
Occupational lung disease	Occupational Lung Disease Clinic Tan Tock Seng Hospital	6357 7000
Occupational lung disease	Occupational Lung Disease Clinic Singapore General Hospital	6321 4402 6321 4377
Occupational Hearing Loss	Joint Occupational Deafness Clinic Tan Tock Seng Hospital	6357 7000
Work-related musculoskeletal disorders	Work-related Musculoskeletal Disorder (WRMSD) Clinic Tan Tock Seng Hospital	6357 7000
Occupational chemical exposure or poisoning	Joint Environmental Occupational Toxicology Clinic (JEOTC) Changi General Hospital	6850 3333

Work injury compensation in Singapore

Under the Work Injury Compensation Act (WICA)³, an employee who sustains injuries in a work-related accident or contracts an occupational disease can claim from his employers (i) medical expenses; (ii) temporary incapacity compensation, where he is paid medical or hospitalization leave wages; and (iii) permanent incapacity compensation, if any. Dependents of employees who die in a work-related accident or from an occupational disease can also claim death compensation.

The WICA provides a simple, low-cost and expeditious alternative to making a claim under Common Law. Unlike Common Law, WICA is a non-fault system. This means the employee does not need to prove that the employer was at fault for his injury to be eligible for compensation. He only needs to show that the injury arose out of and in the course of his employment. The compensation benefits are computed based on fixed formulae and capped under the Act.

Once an employee decides to pursue his claim under the WICA, he will generally no longer be able to lodge a civil claim against his employer for damages. In other words, he will not be able to double claim from WICA and common law.

A Guide to the Assessment of Traumatic Injuries and Occupational Diseases for Workmen's Compensation (GATIOD)⁴ is available to assist doctors in assessing incapacities in work-related injuries and occupational diseases.

CONCLUSIONS

Singapore has a comprehensive OSH framework with strong legislation, policies, structure and systems. A new workplace health strategy launched in April 2010⁵ identified the need for more comprehensive collection of data through strengthening of reporting mechanisms and providing greater compliance assistance in the recognition and diagnosis of occupational diseases. A robust reporting framework and comprehensive statistics will help to tackle and improve OSH issues and to the effectiveness of the OSH framework in the country. The list of OD in the WSHA and WICA are being reviewed for continued relevance and alignment to current developments.

Doctors have a duty to notify cases of occupational diseases. This will allow investigations to proceed and preventive measures to be instituted. Injured workers may also claim their due compensation. It is important for doctors to exercise their duty by notifying cases of ODs to MOM using iReport.

REFERENCES

1. Ministry of Manpower, Medical Monitoring at <http://www.mom.gov.sg/workplace-safety-health/worker-workplace-surveillance/workers-health-surveillance/Pages/default.aspx>*
2. Workplace Safety and Health Act at http://statutes.agc.gov.sg/non_version/cgi-bin/cgi_retrieve.pl?actno=REVED-354A&doctitle=WORKPLACE%20SAFETY%20AND%20HEALTH%20ACT&date=latest&method=part&sl=1*
3. Work Injury Compensation Act at http://statutes.agc.gov.sg/non_version/cgi-bin/cgi_retrieve.pl?actno=REVED-354&doctitle=WORK%20INJURY%20COMPENSATION%20ACT%0a&date=latest&method=part&sl=1*

4. A Guide to the Assessment of Traumatic Injuries and Occupational Diseases for Workmen's Compensation at <http://www.mom.gov.sg/Documents/safety-health/GATIOD-Fifth-Edition.pdf>*
5. Improving Workplace Health Management in Singapore WSH 2018. WSH Council https://www.wshc.sg/wps/themes/html/upload/cms/file/Improving_WSH_Management_Singapore.pdf*

**assessed on 10 Jan 2011*

LEARNING POINTS

- **In Singapore, the reporting of workplace accidents and occupational diseases is a legal requirement under the Workplace Safety and Health (Incident Reporting) Regulations.**
 - **The reporting of occupational accidents and diseases allows investigations to be conducted to establish causality and active case finding to identify others who may also be at risk.**
 - **Early detection is important in the prevention of occupational disease as control measures can be instituted sooner for the protection of the affected worker as well as other workers.**
-

UNIT NO. 5

IMMUNISATION UPTAKE IN SINGAPORE

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ABSTRACT

Good coverage of immunisation in the population is required to reduce the risk of disease transmission to susceptible individuals within a population. The family physician plays a vital role in promoting immunisation by helping the public to understand the benefits and risks associated with vaccines. The submission and maintenance of accurate and timely immunisation records help to shape and guide disease surveillance and monitoring for the population. Singapore's overall immunisation coverage for five key childhood immunisations (measles, diphtheria, tuberculosis, poliomyelitis and hepatitis B) in 2009 for children at two years of age was 97%. While Singapore has achieved good immunisation coverage for the primary doses of key childhood immunisations, there remain challenges. The average coverage for booster dose is 91% for MMR, DPT and Sabin. This needs to be improved. To enhance Singapore's immunisation surveillance, electronic submission will facilitate faster turnaround time for reporting and allow relevant actions to be taken where necessary.

SFP2011; 37(2): 31-35

INTRODUCTION

The family physician plays a central role in immunisation, by helping the public to understand the benefits and risks associated with vaccines. The uptake of immunisation programmes and the development of new vaccines provide opportunities to sustain the health of children (Pollard A 2007). Successful immunisation programs are dependent on high rates of coverage and acceptance (Omer SB, Salmon DA et al. 2009). The avoidance of vaccination may lead to loss of protection from infectious diseases and increase disease incidence, morbidity and mortality (Goh 2010).

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In Singapore, the National Immunisation Registry (NIR) collects data from all healthcare institutions and primary care doctors. It also provides regular updates on immunisation coverage rates for vaccine preventable diseases. This is to facilitate policy formulation to ensure herd immunity in Singapore. The submission and maintenance of accurate and timely immunisation records help to shape and guide disease surveillance and monitoring for the population. The discussion within this paper centres on the following key areas:

- The role of the family physician in the National Immunisation Program.
- Singapore's immunisation coverage rates and challenges faced.
- The use of immunisation data for public health practice.

THE ROLE OF THE FAMILY PHYSICIAN IN THE NATIONAL IMMUNISATION PROGRAMME

The family physician is usually the primary contact for immunisation in the population. In Singapore, a majority of immunisations for children below the age of two years are given at private clinics and polyclinics. Based on 2009 data from the NIR, 41% of immunisations were given at private clinics, 36% at polyclinics and the remaining at public (12%) and private hospitals (11%). Parents are almost twice as likely to consider vaccines to be safe if their immunisation decision was influenced by their child's health care provider (Omer SB, Salmon DA et al. 2009). Family physicians play an important role in delivering immunisation in 3 key ways:

- 1) Educating the public to understand what vaccines are available and essential for their patients depending on their needs. The National Childhood Immunisation Schedule is constantly reviewed to ensure its relevance to the public health picture of vaccine-preventable diseases in the country. Family physicians can help increase awareness of such changes and encourage parents to complete the required vaccine dosage for their children, according to the immunisation schedule.
- 2) Helping to dispel myths on the risks of certain vaccines so that misconstrued perceptions do not lead to decreased immunity. For example, in 2004 there was a measles outbreak involving 94 confirmed cases. The coverage rates for the Measles, Mumps and Rubella (MMR) vaccine are lower in comparison to other vaccines; partly attributed to Wakefield's study published in the Lancet in 1998 which alleged a link between autism and the MMR vaccine (Goh 2010). The family physician can help the public to better understand the risks associated with vaccines due to their specialised knowledge about the indications

for and contraindications to immunisation (Omer SB, Salmon DA et al. 2009).

- 3) Submitting patients' immunisation records in a timely manner to the NIR facilitates better monitoring for the population. Accurate immunisation records can help channel resources to identify sectors of the population with low coverage rates, so that targeted interventions to increase coverage and protect children from disease can be implemented (WHO 2005).

IMMUNISATION COVERAGE IN SINGAPORE

The NIR plays a key role in ensuring that the vaccination records of children from birth to 18 years of age in Singapore is complete, accurate and updated so that coverage rates can be monitored. The NIR also facilitates the provision of immunisation coverage reports to Singapore government ministries, schools and the World Health Organization. Immunisation coverage rates serve as useful indicators for assessing whether a population is adequately immunised and identify areas that need intervention in order to prevent outbreaks of infectious disease.

Coverage for measles, diphtheria, BCG, poliomyelitis & hepatitis B immunisations

Singapore has achieved good immunisation coverage among children for the key diseases - measles, diphtheria, BCG, poliomyelitis and hepatitis B (Table 1) - with the rates comparable to the best in the world. The overall immunisation coverage rate in 2009 for children at two years of age was 97% for all the five vaccines.

Table 1: Immunisation coverage for Singapore Residents at two years of age, 2003-2009.

Year	BCG (%)	DPT (%)	SABIN (%)	MMR (%)	Hep B (%)
2003	99.3	96.0	95.9	93.2	95.3
2004	99.2	94.6	94.5	95.3	93.5
2005	97.8	96.1	96.0	95.6	95.7
2006	98.3	95.4	95.4	94.5	94.6
2007	99.4	96.6	96.6	95.0	95.6
2008	99.5	96.9	96.9	95.0	96.8
2009	99.3	96.8	96.7	95.2	96.4

Source: National Immunisation Registry, Health Promotion Board 2010

Experience of other developed countries

Overall, the national coverage rates for Singapore across the different vaccines are among the best in comparison to developed countries (Table 2). Singapore's coverage rate for Diphtheria (DTP) and Poliomyelitis (Pol) is comparable to countries like Finland and Japan. With the introduction of the immunisation of Hepatitis B (HepB) among new born

children since September 1987 and the implementation of a 4-year catch-up programme conducted among school children in 2001, Singapore has also attained a high coverage of immunisation against HepB of about 96%. The Measles (MCV) immunisation rate is also high compared to that of the UK (86%), USA (92%) and New Zealand (86%).

Challenges in reporting coverage rates

Whilst the primary coverage for the five childhood vaccines is high, the uptake of booster doses is generally lower. This could be due to reasons such as fewer parents taking their children for the booster dose and clinics not submitting their patients' immunisation records to the NIR. Table 3 outlines the primary and booster dose coverage for DPT and Sabin vaccines. Even though the booster coverage improved in 2009 for both vaccines to about 91%, this needs to remain consistent in order to achieve herd immunity.

To promote childhood immunisation awareness, HPB has produced a pamphlet targeting parents, monitoring children with missing measles immunisation notification by sending reminders to the parents and clinics where the last immunisation records were received. Older children are followed-up in schools by HPB's School Health Service during the routine school health visit.

To improve accuracy in notification, NIR has worked with various healthcare institutions to reduce the number of missed notifications for the five childhood immunisations. Electronic submission will aid to improve immunisation surveillance and reporting by enhancing the access to real time data. (Please refer to Annex 1 of this article for guidelines on how to e-submit your patient's immunisation records).

Although the immunisation coverage in Singapore has been maintained around 95%, this is only slightly above the average target coverage to achieve herd immunity. A slight reduction in the immunisation coverage can compromise herd immunity within our population. A concerted effort combining public education by healthcare providers, submission of accurate and timely immunisation reporting, surveillance and monitoring, policy and access to healthcare service is required to achieve high immunisation coverage in the population and prevent disease outbreaks.

THE USE OF IMMUNISATION DATA FOR PUBLIC HEALTH PRACTICE

Accurate immunisation records help identify sectors of the population with low coverage rates so that targeted intervention to increase coverage and protect children from diseases can be implemented. This benefits the entire community. Table 4 outlines the key uses of NIR data for policy makers, healthcare providers and parents. The uptake of two new vaccines (pneumococcal and H1N1) is used to exemplify the utilisation of NIR data.

Table 2: 2008 Immunisation Rates: International Comparisons 2008.

	Singapore	Australia	Canada	Finland	Japan	New Zealand	United Kingdom	United States of America
National coverage rates								
DTP1	98%	97%	97%	99%	99%	91%	97%	99%
DTP3	97%	92%	94%	99%	98%	89%	92%	96%
HepB3	96%	94%	14%	----	----	90%	----	93%
MCV	95%	94%	94%	97%	97%	86%	86%	92%
Pol3	97%	92%	90%	97%	95%	89%	92%	93%

Source: World Health Organization, 2009

Table 3 Primary and booster dose coverage for DPT and Sabin for children at 2 years of age, 2003-2009.

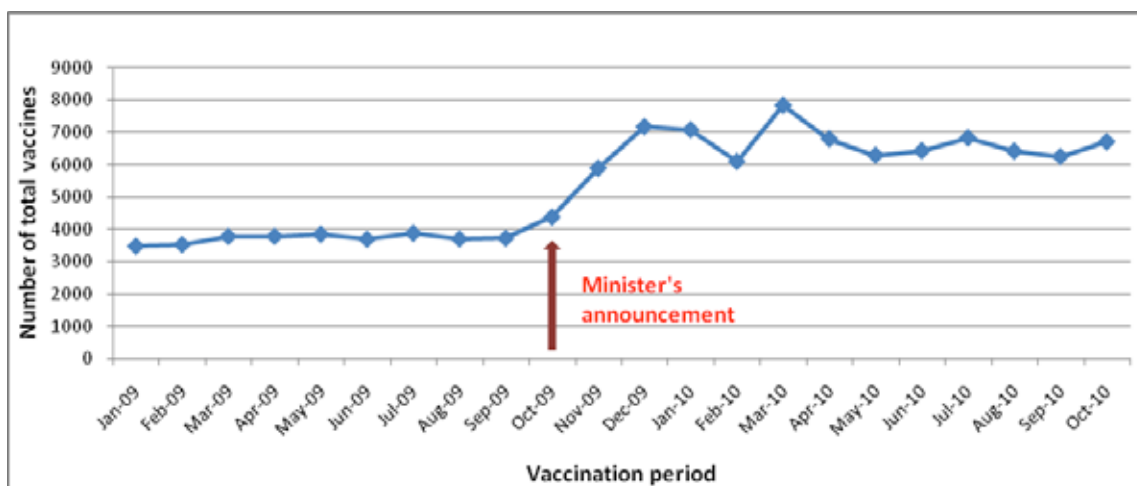
Year	DPT primary dose coverage (%)	DPT booster coverage (%)	Sabin primary dose coverage (%)	Sabin booster coverage (%)
2003	96.0	84.0	95.9	83.0
2004	94.6	89.9	94.5	88.5
2005	96.1	91.0	96.0	90.6
2006	95.4	90.0	95.4	89.7
2007	96.6	88.3	96.6	87.9
2008	96.9	87.3	96.9	86.6
2009	96.8	91.0	96.7	90.6

Source: National Immunisation Registry, Health Promotion Board 2010

Table 4: Utilisation of NIR data for public health practice.

Utilisation of NIR data	
National immunisation coverage	<ul style="list-style-type: none"> To determine and report the overall immunisation and individual vaccine coverage among children from birth till 18 years in Singapore. To assess population that is inadequately immunised so that intervention of policies can be planned and implemented to improve coverage.
Monitoring uptake of vaccines	<ul style="list-style-type: none"> Monitors immunisation uptake of new vaccines to assist in the decision making process for administering vaccinations to the population. e.g. Pneumococcal vaccine. Analyse the number of doses administered and to calculate the incidence rate of any adverse event that occurred. e.g. H1N1 vaccine.
Assist health care providers	<ul style="list-style-type: none"> Immunisation history for each individual child is consolidated from various health care providers. To help health care providers determine which vaccines are required for their patients as per the immunisation record of the patient.
Reminders and notifications to parents*	<ul style="list-style-type: none"> To notify parents when their child is due for immunisation or has missed a particular immunisation. This helps both the parents and the healthcare providers to ensure that a child is only immunised with the required vaccines.
E-Services for the public and healthcare services	<ul style="list-style-type: none"> On-line immunisation history of children allows physicians to check immunisation records before administering vaccine. Parents are also able to check the history of their child's immunisation history.

Figure 1. Primary dose coverage rates for Pneumococcal vaccination, 2009-2010.



Source: National Immunisation Registry, Health Promotion Board 2010

Pneumococcal vaccination for children

The pneumococcal vaccine was included in the National Childhood Immunisation Schedule in October 2009. Epidemiological studies had showed a significant burden in Singapore due to invasive pneumococcal disease (Lee 2010). Prior to the official introduction of the vaccine, the vaccine coverage was an estimate of 20% of all newborns (Ministry of Health Singapore 2009). Results of the NIR data from 2009-2010 showed a noticeable rise in the number of vaccines administered after the Ministry’s announcement in October 2009 of its inclusion in to the Schedule and allowing MediSave to be used for paying the cost of the immunisation.

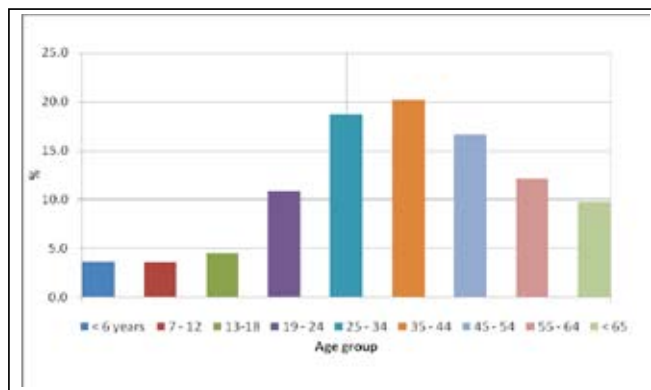
H1N1 Influenza vaccination

The H1N1 vaccine became available in December 2009 during the H1N1 pandemic of 2009. The NIR monitored the uptake of the vaccine in the population. The majority of patients who received the H1N1 vaccination were adults, with the 35-44 year age group recording the highest uptake at 22 % (Figure 3). The records also enabled the Health Sciences Authority (HSA) to profile the safety of the H1N1 vaccines. Physicians were also able to use the NIR system to submit the immunisation records and check the vaccination details of their patients.

CONCLUSIONS

The family physician plays a key role in the immunisation delivery of new and routine vaccines by educating the public on the risks and benefits associated with vaccines. The challenges in reporting coverage rates for the Singapore population are attributed to the low uptake of booster doses and missed notifications within patients’ immunisation

Figure 2: H1N1 vaccination uptake by age group, 2010.



Source: National Immunisation Registry, Health Promotion Board 2010

records. The timely and accurate submission of immunisation data is vital for recording the immunisation coverage rates. Disease surveillance and monitoring for the population can be enhanced by electronic submission of immunisation data by family physicians.

REFERENCES AND FURTHER READING

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LEARNING POINTS

- **The family physician plays a central role in immunisation, by helping parents to understand the benefits and risks associated with vaccines. Key benefits of immunisation include protection for individuals who have not developed immunity for vaccine preventable diseases.**
- **Successful immunisation requires a significant portion of the population to be vaccinated against a particular disease. The avoidance of vaccination may lead to loss of protection from infectious diseases and an increase in disease incidence, morbidity and mortality.**
- **The submission and maintenance of accurate and timely immunisation records help to shape and guide disease surveillance and monitoring for the population. Immunisation data can be used to guide public health program planning for identifying populations at high risk for vaccine preventable diseases.**
- **Immunisation data from new vaccines and booster doses of routine vaccines assist in the decision making process for administering vaccinations to the population.**
- **E-submission assists in achieving a more accurate data collection process by reducing the time lag for data processing and human error and improving access to real time data.**

E-Submission to National Immunisation Registry

National Immunisation Registry (NIR) is accessible for all the general practitioners through the Health Professional Portal (HPP) @ www.hpp.moh.gov.sg.

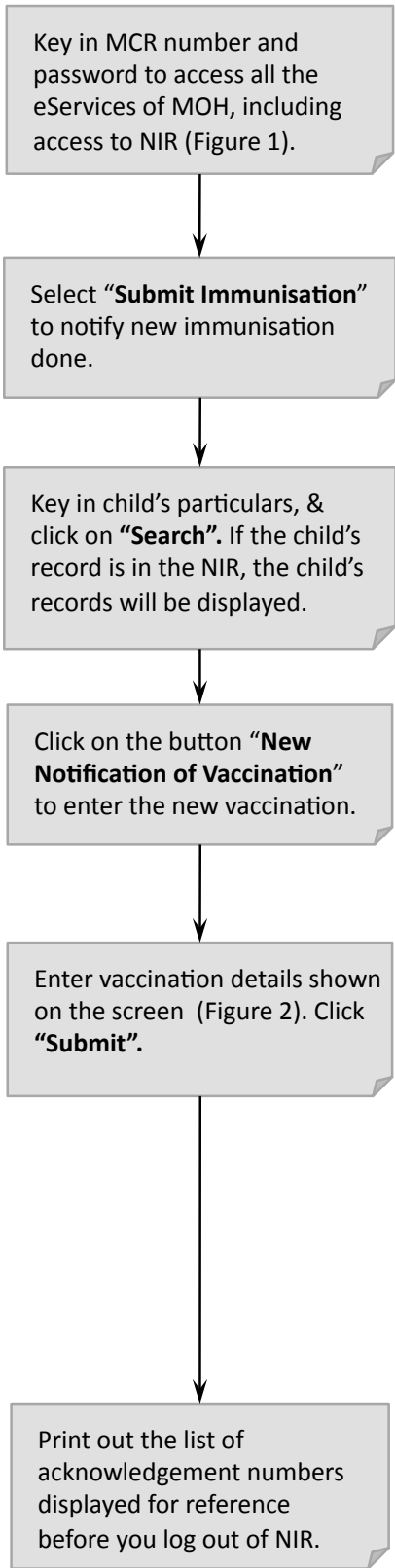


Figure 1: NIR webpage for immunisation notification by doctors

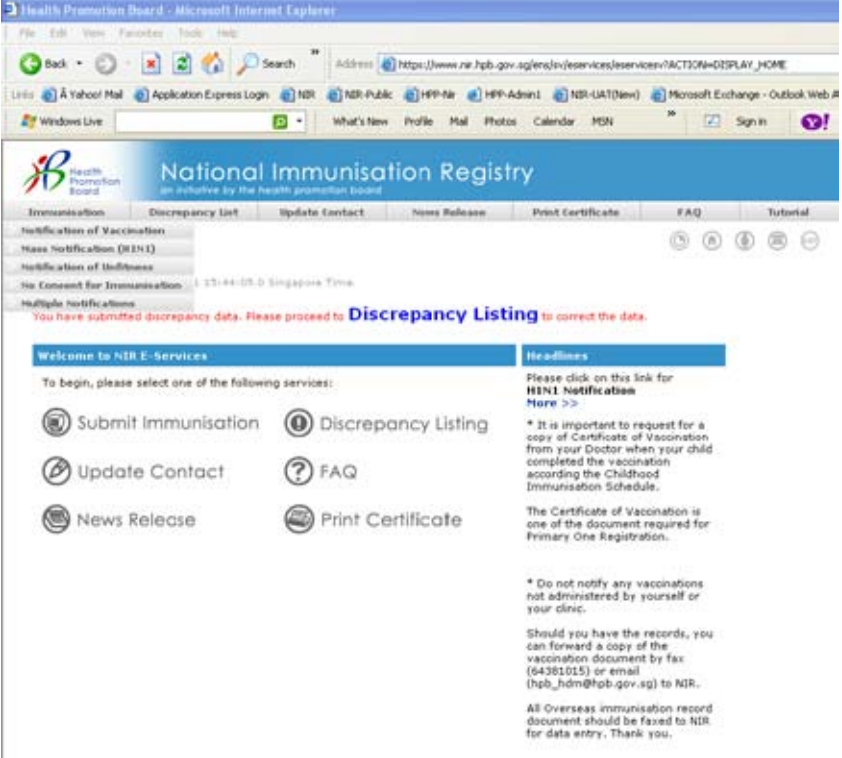
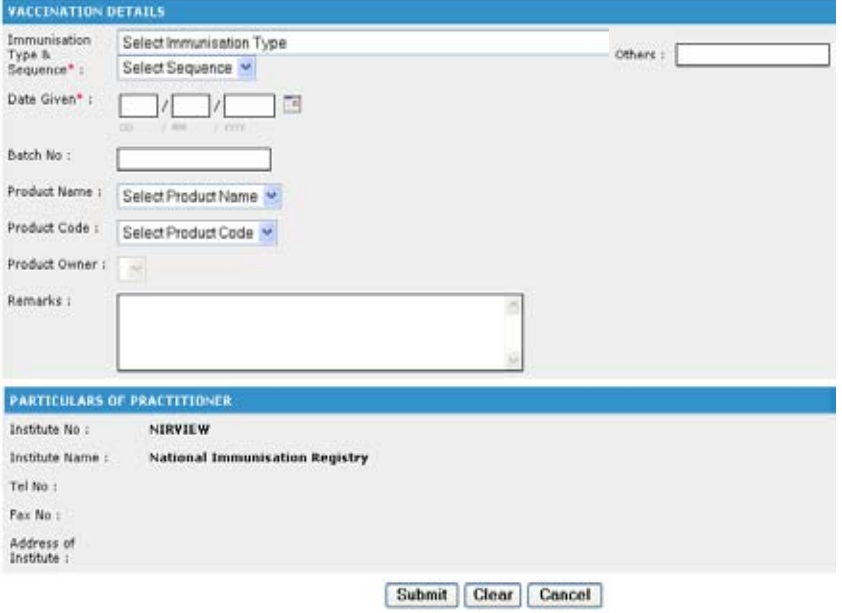


Figure 2: Vaccination Details Screen



UNIT NO. 6

HSA ADVERSE EVENT WATCH - PARTNERSHIP IN VIGILANCE

Belinda Tan, Dorothy Toh, Sally Soh

**ABSTRACT**

The national spontaneous adverse event (AE) monitoring system administered by the Health Sciences Authority (HSA) is supported by a network of healthcare professionals, who actively report adverse reactions of health products observed in clinical practice.

When a new health product is submitted for registration, the demonstration of its efficacy and the evaluation of its safety are generally based on a limited number of patients in clinical trials. In addition, the exclusion of certain patient groups in clinical trials, the lack of significant long-term treatment experience, and limitation of concomitant therapies do not allow a thorough evaluation of the safety profile. Under such circumstances, the detection or confirmation of rare AEs is particularly difficult during the pre-registration development of the product. In order to develop a comprehensive picture of clinical safety, marketed health products have to be closely monitored for their safety when used in actual practice.

Surveillance of health products is an important aspect of the continual benefit-risk assessment of the product. Surveillance activities include mandatory reporting from pharmaceutical manufacturers, spontaneous reporting from health professionals, literature reviews and the exchange of regulatory information with other national drug regulatory bodies.

Among these approaches, the spontaneous AE reporting by the health professionals forms the cornerstone of post-marketing safety surveillance. It remains one of the most important ways of monitoring the safety of a health product throughout its marketed life.

When an AE occurs, the assessment of the possible contributory roles of a health product is an important part of the clinical diagnostic process. This is valuable information that many physicians have shared with HSA over the past years, which has enabled us to identify key safety signals from the local use of marketed health products.

SFP2011; 37(2): 36-38

BELINDA TAN, DOROTHY TOH, SALLY SOH, Senior Regulatory Specialist, Vigilance Branch, Health Products Regulation Group, Health Sciences Authority

INTRODUCTION

An adverse event (AE) is defined as any untoward medical occurrence that may present during treatment with a health product but which does not necessarily have a causal relationship with this treatment. It excludes AE caused by accidental or deliberate overdoses and medication errors.

HSA encourages all healthcare professionals to report AEs experienced by your patients especially those that are suspected to be associated with a health product. Reporting an adverse event does not necessarily mean that there is a definite link between the event and the health product.

WHAT TO REPORT?

Report any serious and unexpected adverse events to marketed health products.

Health products include:

- Prescription drugs and over-the-counter (OTC) medicines.
- Vaccines and other biologics.
- Medical devices.
- Complementary medicines such as traditional Chinese medicines, Malay traditional medicine, (e.g. Jamu) and Health Supplements.
- Cosmetics.

In particular, please report

- All serious and non-serious adverse events to recently marketed health products that are new in the Singapore market.
- All serious adverse events to established drugs, even if the reactions are well known. This allows us to give advice on how the drug can be used more safely in clinical practice.
- All unexpected events to established drugs, i.e. adverse reactions that are not listed in the product package insert or labelling.
- All serious adverse events to complementary and herbal remedies.

WHAT IS A SERIOUS ADVERSE EVENT OR REACTION?

A serious adverse event or reaction is one which leads to the following outcomes:

- **Death or Life-threatening**

Report if you suspect that the death was an outcome of the AE or the patient was at a high of risk of dying at the time of the AE, or the continued use of the product (e.g. device) would have resulted in the death of the patient.

- **Hospitalisation (Initial or prolonged)**

Report if you suspect that the patient was warded at the hospital or had prolonged hospitalisation as a result of the AE.

- **Disability or Permanent Damage**

Report if the AE resulted in a significant, persistent or permanent impairment or disruption in the patient's body function or quality of life.

- **Birth Defect**

Report if you suspect that exposure to a medical product prior to conception or during pregnancy may have resulted in the adverse outcome in the child.

- **Other Medically Significant/Important Events**

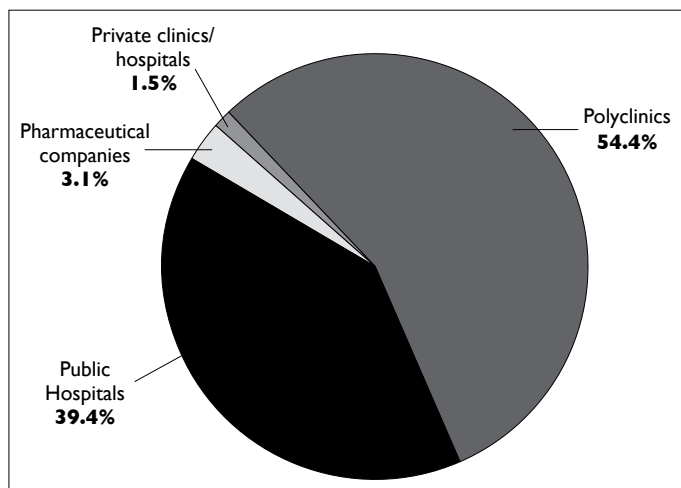
Report when the AE might not be immediately life-threatening or result in death or hospitalisation but might jeopardise the patient or require intervention to prevent one of the other outcomes listed in the definition above. Examples of such events are emergency treatment for allergic bronchospasm, blood dyscrasias or convulsions that do not result in hospitalization, or development of drug dependency or drug abuse.

HOW MANY AE REPORTS HAVE HSA RECEIVED?

In 2010, HSA's Vigilance Branch reviewed a total of about 11,200 reports and 45% of these were classified as serious reactions. Majority of reports analysed were associated with pharmaceuticals/biologics (97.6%) followed by vaccines (1.9%) and complementary medicines (0.5%).

Most of the reports were from healthcare professionals working in the government clinics (54.4%), followed by public hospitals (39.4%), pharmaceutical companies (3.1%) and private clinics/hospitals (1.5%). See Figure 1.

Figure 1: Sources of AE Reports in 2010



WHAT TYPE OF INFORMATION IS COLLECTED ON AE REPORTING FORMS?

When reporting an AE, please fill in as much information as you know in order to help us assess causality of the adverse reaction. Do not refrain from reporting because some details are not known. Be assured that patient's and reporter's identities are kept in strict confidence.

The following information is required -

- Patient's particulars (e.g. initials, age, gender).
- Reporter's details (e.g. Name, place of practice, contact number).
- Details of adverse event (e.g. description, date of first occurrence of event).
- Suspect health product(s) (e.g. brand name or active ingredient(s), dose, period of intake).
- Concomitant health product(s) (e.g. including complementary medicines).
- Outcome of the patient (e.g. seriousness of event; Was patient hospitalised; Has patient recovered?).
- Treatment given to patient.
- Other relevant information (e.g. known allergies, lab test report).

SUBMIT YOUR AE REPORTS ONLINE - A FASTER AND EASIER OPTION



For faster and easier reporting, you are encouraged to submit AE reports online at the following HSA's website: www.hsa.gov.sg/ae_online

Alternatively, you may download the AE reporting forms for health products at the same website and submit them to the Vigilance Branch of HSA:

- Email address: HSA_productsafety@hsa.gov.sg
- Fax: 6478 9069
- Phone: 6 866 3538/9

Any follow-up information for an AE that has already been reported can be sent to us on another form or can be reported via the other available modes of reporting. Please indicate that it is a follow-up report. It is very important that follow-up reports are identified and linked to the original report.

Upon submission of an AE report, the reporting doctor can request information on the suspected health product or ask to be updated on the investigation or causality assessment conducted by the Vigilance Branch of HSA by providing us with his contact details.

HOW TO GAIN ACCESS TO HSA AE DATABASE?

All registered doctors can gain access to anonymised case reports online at HSA's AE enquiry database via your MCR no or SingPass at the following website:

MOH's Health Professional Portal (HPP): http://www.hpp.moh.gov.sg/HPP/HPP_Home.html

Print Screen of HSA AE Database Online



HOW WOULD YOUR REPORT CONTRIBUTE TO SAFETY SURVEILLANCE OF HEALTH PRODUCT?

Each report is individually reviewed with more attention spent on the serious AE reports. The information is then entered into the computer database for aggregate analysis.

The AE reports may identify unexpected adverse events or indicate that certain adverse events occur more commonly than previously expected, or that some patients are more susceptible to some problems than others. Such findings can lead to changes in the marketing authorisation, for example restrictions in use, refinement of those instructions or the introduction of specific warnings of adverse events in product package insert. In rare circumstances, when a hazard is considered unacceptable, a registered health product may have to be withdrawn from the market.

HSA also contributes to the international surveillance of drug safety signals as a member of the World Health Organisation (WHO) International Drug Monitoring Programme, by submitting these anonymised AE reports to the WHO-Uppsala Monitoring Centre in Sweden. In 2010, the success of the monitoring system enabled Singapore to be ranked the 3rd country with the highest number of reports per million inhabitants, after New Zealand and United States of America.

WHAT ARE THE TYPES OF SAFETY INFORMATION AND HOW ARE THEY COMMUNICATED?

Examples of safety information:

- Withdrawal or suspension of a health product.
- Major safety issues associated with the use of a health product.
- Safety information which may have significant impact on clinical practice.
- Interim safety updates and regulatory positions while evaluating emerging safety signals associated with a health product.
- Adulteration of a health product.

Communication channels include:

- Dear Healthcare Professional Letters at HSA/ MOH-Health professionals Portal (MOH-HPP) Website: To login to the secured webpage <http://www.hpp.moh.gov.sg/>
- Adverse Drug Reaction (ADR) News Bulletin: www.hsa.gov.sg/adrbulletin
- HSA Product Safety Alerts and Interim Safety Updates http://www.hsa.gov.sg/pdt_safetyalerts
- Press Releases: http://www.hsa.gov.sg/press_releases
- Package Insert Updates: http://www.hsa.gov.sg/label_amend

LEARNING POINTS

- **Reporting AE contributes to continued surveillance of health product's safety because there is limited safety information surrounding a health product when it is introduced into the market.**
- **HSA encourages all healthcare professionals to report all AEs , even if the role of the suspected product in the AE is yet to be ascertained.**
- **Patient's and reporter's identities are kept in strict confidence.**
- **Report AEs on-line via HSA's website for convenience.**
- **All registered doctors can gain access to anonymised case reports online at HSA's AE enquiry database via your MCR no. or SingPass through the MOH-HPP Portal.**

ASSESSMENT OF 30 MCQs

FPSC NO : 40 MCQs on On-line Notifications & E-Services Platforms Submission DEADLINE : 12 APRIL 2011

INSTRUCTIONS

- To submit answers to the following multiple choice questions, you are required to log on to the College On-line Portal (www.cfps2online.org).
- Attempt ALL the following multiple choice questions.
- There is only ONE correct answer for each question.
- The answers should be submitted to the College of Family Physicians Singapore via the College On-line Portal before the submission deadline stated above.

1. **One of the goals of the Infocomm Development Authority of Singapore is that there will be X% broadband usage in all homes in Singapore in 2015. What is X?**
 - A. 60.
 - B. 70.
 - C. 80.
 - D. 90.
 - E. 100.

2. **The Clinical Management System (CMS) programme that was completed in December 2008, aimed to encourage greater infocomm adoption by General Practitioner (GP) clinics to facilitate their operations. Moving forward, what is its next strategy?**
 - A. The GP IT-Enablement programme launched in 2011.
 - B. The GP IT-Enablement programme launched in 2009.
 - C. Electronic Medical Records (EMRs) launched in 2010.
 - D. Electronic Medical Records (EMRs) launched in 2009.
 - E. None of the above.

3. **One of the notifications that healthcare providers must submit to the National Immunisation Registry (NIR) are immunisations that were done. Which Government agency receives the submissions?**
 - A. Ministry of Health.
 - B. Singapore Medical Council.
 - C. Health Sciences Authority.
 - D. Ministry of Community, Youth, and Sports.
 - E. Health Promotion Board.

4. **Submissions of chronic disease indicators (Medisave for CDMP) are received by X. What is X?**
 - A. Health Sciences Authority.
 - B. Singhealth or National Healthcare Group.
 - C. Ministry of Health.
 - D. Central Provident Fund.
 - E. Ministry of Finance.

5. **With regard to e-Services, which of the following website would you use to look up foreground information for the care of a patient with Parkinson's disease?**
 - A. World Health Organisation.
 - B. PubMed.
 - C. Wikipedia.
 - D. Google Scholar.
 - E. e-Medicine.

6. **If a doctor requires assistance in obtaining the necessary equipment and Internet service for his clinic, he can complete an IT Enquiry Form for General Practitioners and fax it to X before June 2011. What is X?**
 - A. 63258451.
 - B. 64382000.
 - C. 62231313.
 - D. 62220000.
 - E. 62215538.

7. **About the drawbacks in using faxes as a form of notification of infectious diseases, which of the following is the greatest drawback?**
 - A. Doctors need to be contacted to verify data due to illegible handwriting.
 - B. Faxes sent are often incomplete.
 - C. Timely availability of disease outbreak information is difficult to achieve.
 - D. All professional bodies feel that faxes are the way to go.
 - E. None of the above.

8. **Based on the enrolment figures of GP clinics in the chronic disease management programme, at least X% of GP clinics had computers and Internet access. What is X?**
- 36.
 - 46.
 - 56
 - 66.
 - 76.
9. **The Infectious Diseases Act (IDA) is jointly administered by the Ministry of Health and another organisation. What is the name of this organisation?**
- Ministry of the Environment.
 - Centre for Communicable Disease Control.
 - Tan Tock Seng Hospital.
 - National Environment Agency.
 - Middleton Hospital.
10. **About on-line notification of infectious diseases, which of the following statements is CORRECT?**
- On-line will be encouraged by MOH together with SMA & CFPS.
 - MOH will engage all doctors to attend courses or workshops to familiarise themselves with the on-line notification.
 - It is believed that on-line notification in the practice of medicine would become a definite eventuality in Singapore.
 - On-line notification of infectious diseases will benefit both doctors as well as MOH.
 - All of the above are correct.
11. **In the notification of tuberculosis, Form X is used. What is X?**
- MD 333.
 - MD 532.
 - MD 131.
 - MD 117.
 - MD 101.
12. **CD-LENS (Communicable Diseases Live & Enhanced Surveillance) has three main functions. Two of these are infectious disease notification, and outbreak management. What is the third main function?**
- It provides FAQs on history of communicable diseases.
 - It provides checklist of what investigations are not useful.
 - It provides real time information access.
 - It provides counseling strategies.
 - It provides details on dealing with quarantine issues.
13. **One of the e-Services accessible on the Health Professionals Portal (HPP) is the Postgraduate Training Management System. Which of the following best describes the service provided?**
- It is an on-line logbook.
 - It is a repository of posting instructions.
 - It is a collection of compulsory reading notes.
 - It contains the curriculum for each posting.
 - It takes care of vacation and sick leave documentation.
14. **One of the e-Services accessible on the Health Professionals Portal (HPP) is the Health Check System. Which of the following best describes the service provided?**
- It records physical findings of patients with symptoms of respiratory infection.
 - It records particulars of patients who are at high risk for pandemic influenza.
 - It tracks patients who are immunised against pandemic influenza in the 2009 outbreak.
 - It records particulars of patients who are under quarantine.
 - It tracks prescription for Tamiflu during the H1N1-2009 influenza pandemic.
15. **One of the e-Services accessible on the Health Professionals Portal (HPP) is the SMC Online System. Which of the following best describes the service provided?**
- CME organisers can send their queries here if their submissions are not accepted.
 - Doctors can apply for extension for submission of credit points.
 - Doctors can book CME talks.
 - Doctors can submit credit claims for CME.
 - None of the above.
16. **All registered medical practitioners are required to report any of the occupational diseases listed in the Workplace Safety and Health Act to Ministry of Manpower (MOM) within X from the diagnosis of the disease. What is X?**
- 48 hours.
 - 1 week.
 - 10 days.
 - 2 weeks.
 - 1 month.

- 17. About reportable occupational diseases, which of the following is an example?**
- A restaurant chef who developed Hepatitis A.
 - A soldier who has asthma after a 4 km run.
 - A night club manager with perforated tympanic membrane as a result of otitis media.
 - A SMRT tunnel worker who developed compressed air illness.
 - A beautician who suffers from endogenous eczema.
- 18. About confirmed occupational diseases, which of the following is the leading occupational disease in Singapore?**
- Noise induced deafness.
 - Occupational skin disease.
 - Barotrauma.
 - Excessive absorption of chemicals.
 - Occupational lung disease.
- 19. Which of the following regarding the role of occupational health clinics is CORRECT?**
- Assists in the confirmation of diagnosis.
 - Manages the effects and complications from the workplace exposure.
 - Conducts workplace assessments where indicated.
 - Provides recommendations on preventive measures.
 - All of the above are correct.
- 20. Under the Work Injury Compensation Act (WICA), an employee who sustains injuries in a work-related accident or contracts an occupational disease can claim which of the following from his employers?**
- Paid annual leave.
 - Paid medical or hospitalization leave.
 - Permanent incapacity compensation on top of his civil claims.
 - Extended medical leave of up to 2 months.
 - Extended hospitalization leave of up to 6 months.
- 21. In Singapore, what does the National Immunisation Registry(NIR) do?**
- It collects data from all healthcare institutions.
 - It collects data from all primary care doctors.
 - It monitors immunisation uptake of new vaccines.
 - It assist health care providers to enable them to check online the immunisation history.
 - It does all of the above.
- 22. In Singapore, the majority of immunisations for children 2 years of age and below are given by X. What is X?**
- KK Hospital.
 - Private clinics and polyclinics.
 - National University Hospital.
 - Private specialist clinics.
 - Mt Elizabeth Hospital.
- 23. About immunisation coverage in Singapore, which of the following statements is CORRECT?**
- NIR keeps record of all children from birth to 12 years old.
 - Immunisation coverage rates serve as useful indicators for assessing whether a population is adequately immunised.
 - Immunisation coverage rates cannot identify areas that need intervention to prevent outbreaks.
 - The coverage for measles, diphtheria, BCG, polio and Hepatitis B in Singapore is less than 75% for children 2 years old and younger.
 - The immunisation coverage against Hepatitis B is 90%.
- 24. The primary coverage for the five key childhood vaccines is high in Singapore. However, the uptake of booster doses is generally lower. What is the reason?**
- Fewer parents are taking the children for the booster doses.
 - Clinics may have missed out submitting to the NIR.
 - Some children may be sick when the school health service visits.
 - Some parents forget.
 - All of the above are correct.
- 25. With regards to H1N1 influenza vaccination in December 2009, the majority of patients who received the H1N1 were adults. Of these, which of the following had the highest uptake?**
- 65 and older age group.
 - 55-64 age group.
 - 45-54 age group.
 - 35-44 age group.
 - 25-34 age group.
- 26. Which of the following is a CORRECT assumption of the safety and efficacy of most newly registered products brought to the market?**
- It is based on large scale clinical trials ensuring its safety.
 - Most patient groups are accounted for during clinical trials.
 - There is adequate long term treatment experience.
 - Evaluation of concomitant therapies is limited.
 - Rare adverse events can be picked up during pre-registration development.

27. Which of the following is considered an Adverse Event as defined by HSA?

- A. A patient develops acute hepatitis after ingesting slimming pills.
- B. A depressed patient is brought by her parents for overdosing on 20 tablets of paracetamol.
- C. A mother accidentally gave her child 20 mls of chlorpheniramine instead of 2 mls.
- D. A patient swallows a suppository thinking it was a pill to be taken.
- E. All the above are considered as Adverse Events.

28. Which of the following is considered a health product?

- A. Lipstick.
- B. Electronic blood pressure set.
- C. Herbal slimming pills.
- D. Skin whitening face mask.
- E. All of the above are considered health products.

29. Which of the following is considered a Serious Adverse Event as defined by HSA?

- A. A patient needs more than 3 days medical leave to recover from the adverse event.
- B. A patient is warded in hospital as a result of the adverse event.
- C. Any adverse event occurring during pregnancy.
- D. A patient dies from deliberate overdose.
- E. All the above are correct.

30. Which of the following was the leading cause of serious adverse events based on reports received by HSA in 2010?

- A. Pharmaceuticals.
- B. Vaccines.
- C. Cosmetics.
- D. Complementary medicines.
- E. Faulty medical devices.



R E A D I N G S

- A Selection of Ten Current Readings on Topics Related To On-line Notifications & E-Services Platforms

A SELECTION OF TEN CURRENT READINGS ON TOPICS RELATED TO ON-LINE NOTIFICATIONS & E-SERVICES PLATFORMS – available as free full-text

Selection of readings made by A/Prof Goh Lee Gan

READING 1 – National childhood immunization programme in Singapore

Liew F, Ang LW, Cutter J, James L, Goh KT. Evaluation on the effectiveness of the national childhood immunisation programme in Singapore, 1982-2007. Ann Acad Med Singapore. 2010 Jul;39(7):532-10. PubMed PMID: 20697671.

URL: <http://www.annals.edu.sg/pdf/39VolNo7Jul2010/V39N7p532.pdf> (free full text)

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SUMMARY

INTRODUCTION: We undertook a study to evaluate the effectiveness of the National Childhood Immunisation Programme (NCIP) over the past 26 years by reviewing the epidemiological trends of the diseases protected, the immunisation coverage and the changing herd immunity of the population during the period of 1982 to 2007.

MATERIALS AND METHODS: The epidemiological data of all cases of diphtheria, pertussis, poliomyelitis, measles, mumps, rubella and acute hepatitis B notified to the Communicable Diseases Division, Ministry of Health (MOH) from 1982 to 2007 were collated and analysed. Data on tuberculosis (TB) cases were obtained from the TB Control Unit, Tan Tock Seng Hospital. Cases of neonatal tetanus and congenital rubella syndrome (CRS) among infants born in Singapore were identified from the Central Claims Processing System. The number of therapeutic abortions performed for rubella infections was retrieved from the national abortion registry. Coverage of the childhood immunisation programme was based on the immunisation data maintained by the National Immunisation Registry, Health Promotion Board. To assess the herd immunity of the population against the various vaccine-preventable diseases protected, the findings of several serological surveys conducted from 1982 to 2005 were reviewed.

RESULTS: The incidence of vaccine-preventable diseases covered under the NCIP had declined over the last 26 years with diphtheria, neonatal tetanus, poliomyelitis and congenital rubella virtually eliminated. The last case of childhood TB meningitis and the last case of acute hepatitis B in children below 15 years were reported in 2002 and 1996, respectively.

CONCLUSION: The NCIP has been successfully implemented as evidenced by the disappearance of most childhood diseases, excellent immunisation coverage rate in infants, preschool and school children, and high level of herd immunity of the childhood population protected. PMID: 20697671 [PubMed - indexed for MEDLINE]

READING 2 – Contact lens-related keratitis

Tu EY, Joslin CE. Recent outbreaks of atypical contact lens-related keratitis: what have we learned? Am J Ophthalmol. 2010 Nov;150(5):602-608.e2. PubMed PMID:21036209.

URL: [http://linkinghub.elsevier.com/retrieve/pii/S0002-9394\(10\)00529-5](http://linkinghub.elsevier.com/retrieve/pii/S0002-9394(10)00529-5) (free full text)

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SUMMARY

PURPOSE: To examine the public health implications of 2 recent outbreaks of atypical contact lens-related infectious keratitis.

DESIGN: Perspective based on the literature and authors' experience.

RESULTS: The contact lens-related *Fusarium* and *Acanthamoeba* keratitis outbreaks were each detected by dramatic rises seen in tertiary care centers in Singapore and the United States, respectively. Case-control studies of both outbreaks were able to identify a strong association with the use of different contact lens disinfection solutions. Their respective recalls resulted in a steep decline of *Fusarium* keratitis, but not of *Acanthamoeba* keratitis. Early investigations into each solution association implicated components not directly related to their primary disinfectant, but the true pathogenesis remains unknown. However, the number of *Acanthamoeba* cases individually attributed to each of almost all available disinfection systems exceeds the previously understood total United States incidence, suggesting other risk factors. Current standards do not require demonstration of anti-*Acanthamoeba* activity. Yet, despite the inclusion of *Fusarium* in mandatory testing for solutions, current premarket testing was not predictive of the outbreak.

CONCLUSIONS: The 2 recent outbreaks of atypical contact lens-related keratitis have reinforced the value of tertiary care eye care centers in detecting early rises in rare infections and the power of adaptable, well-designed epidemiologic investigations. Although *Fusarium* keratitis has declined significantly with the recall of Renu with MoistureLoc (Bausch & Lomb Inc.), the persistence of *Acanthamoeba* keratitis demands fundamental changes in contact lens hygiene practices, inclusion of *Acanthamoeba* as a test organism, and contact lens disinfectant test regimens for all contact lens-related pathogens that are verifiably reflective of end user contact lens wear complications. PMID: 21036209 [PubMed - indexed for MEDLINE]

READING 3 – Hepatitis B seroprevalence

Hong WW, Ang LW, Cutter JL, James L, Chew SK, Goh KT. Changing seroprevalence of hepatitis B virus markers of adults in Singapore. Ann Acad Med Singapore. 2010 Aug;39(8):591-8. PubMed PMID: 20838699.

URL: <http://www.annals.edu.sg/pdf/39VolNo8Aug2010/V39N8p591.pdf> (free full text)

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SUMMARY

INTRODUCTION: We presented the findings from 2 seroprevalence studies conducted 6 years apart, so as to determine changes in the hepatitis B surface antigen (HBsAg) positivity rate and immunity to hepatitis B virus (HBV) among Singapore residents aged 18 to 69 years, and to assess the impact of a 4-year catch-up hepatitis B immunisation programme for adolescents and young adults launched in 2001.

MATERIALS AND METHODS: Two hepatitis B seroprevalence studies (HBSS) were conducted in 1999 and 2005 based on stored blood samples collected from 4698 participants aged 18 to 69 years during the national health survey (NHS) 1998 and from 3460 participants during the NHS 2004, respectively. Serology for HBsAg, hepatitis B e antigen (HBeAg) and antibody to HBsAg (anti-HBs) were tested by enzyme immunoassay in HBSS 1999 and electrochemiluminescence in HBSS 2005.

RESULTS: The overall age-standardised prevalence of HBsAg among Singapore residents aged 18 to 69 years decreased significantly from 4.0% in HBSS 1999 to 2.8% in HBSS 2005 ($P = 0.002$). The age-standardised prevalence of HBsAg in males (4.9% in 1999) and Chinese (4.7% in 1999) both decreased significantly to 2.7% and 2.8%, respectively in 2005. The overall age-standardised population immunity to HBV (anti-HBs >10 mIU/ml) increased from 39.7% in 1999 to 42.1% in 2005 ($P = 0.019$). In particular, the age-specific prevalence of anti-HBs showed a significant increase among those in the age group of 18 to 29 years from 27.9% in 1999 to 41.7% in 2005 ($P < 0.001$) and among those in the age group of 30 to 39 years from 39.9% in 1999 to 44.7% in 2005 ($P = 0.021$).

CONCLUSION: There was an overall decline in the HBsAg positivity rate as well as an overall increase in population immunity to HBV. Following the 4-year catch-up immunisation programme, there was a significant increase in the immunity to HBV infection in the younger population aged 18 to 29 years. PMID: 20838699 [PubMed - in process]

READING 4 – Dengue virus surveillance

Lee KS, Lai YL, Lo S, Barkham T, Aw P, Ooi PL, Tai JC, Hibberd M, Johansson P, Khoo SP, Ng LC. Dengue virus surveillance for early warning, Singapore. Emerg Infect Dis. 2010 May;16(5):847-9. PubMed PMID: 20409381; PubMed Central PMCID: PMC2953985.

URL: <http://www.ncbi.nlm.nih.gov/pmc/articles/pmid/20409381/?tool=pubmed> (free full text)

Environmental Health Institute, Singapore.

SUMMARY

In Singapore, after a major outbreak of dengue in 2005, another outbreak occurred in 2007. Laboratory-based surveillance detected a switch from dengue virus serotype 1 (DENV-1) to DENV-2. Phylogenetic analysis showed a clade replacement within DENV-2 cosmopolitan genotype, which accompanied the predominant serotype switch, and co-circulation of multiple genotypes of DENV-3. PMCID: PMC2953985 PMID: 20409381 [PubMed - indexed for MEDLINE]

READING 5 – Outbreak of pandemic influenza A

Ang LW, Lai FY, Subramony H, Ma S, James L. Outbreak of pandemic influenza A (H1N1-2009) in Singapore, May to September 2009. Ann Acad Med Singapore. 2010 Apr;39(4):273-10. PubMed PMID: 20473451.

URL: <http://www.ncbi.nlm.nih.gov/pubmed?term=%3A%2020473451%5Buid%5D>

Communicable Diseases Division, Ministry of Health, Singapore.

SUMMARY

INTRODUCTION: The first case of pandemic influenza A(H1N1) was detected in Singapore on 26 May 2009, 1 month after the first cases of novel influenza A(H1N1) was reported in California and Texas in the United States. The World Health Organization declared the first influenza pandemic of the 21st century on 11 June 2009.

MATERIALS AND METHODS: Confirmed cases notified to the Ministry of Health between 27 May and 9 July 2009 were analysed. Various indicators of influenza activity were monitored throughout the study period. Estimates of the number of cases of H1N1-2009 were made using the number of polyclinic attendances for acute respiratory infection and influenza-like illness and the weekly prevalence of H1N1-2009.

RESULTS: Cases in Singapore affected mainly young adults, youths and children. By the end of September 2009, it was estimated that at least 270,000 persons had been infected by pandemic influenza A (H1N1) in Singapore. The peak number of cases occurred during E-week 30 (26 July-1 August) when an estimated 45,000 cases were seen in polyclinics and GP clinics. The hospitalisation, severe illness and mortality rates were estimated at 6 per 1000 cases, 0.3 per 1000 cases and 6.7 per 100,000 cases, respectively. The most common risk factors among hospitalised adult cases were asthma and diabetes. For hospitalised children, the most common risk factors were being under 5 years of age and asthma. The most common risk factors among persons with severe illness were diabetes in adults and epilepsy and being under 5 years of age in children. About half of cases with severe illness required mechanical ventilation. In addition, one-fifth of cases with severe illness had acute respiratory distress syndrome.

CONCLUSIONS: The first wave of the influenza pandemic lasted about 10 weeks. Morbidity and mortality resulting from pandemic influenza were low. PMID: 20473451 [PubMed - indexed for MEDLINE]

READING 6 – H1N1 pandemic – lessons learnt

Tay J, Ng YF, Cutter JL, James L. Influenza A (H1N1-2009) pandemic in Singapore--public health control measures implemented and lessons learnt. Ann Acad Med Singapore. 2010 Apr;39(4):313-12. PubMed PMID: 20473458.

URL: <http://www.annals.edu.sg/pdf/39VolNo4Apr2010/V39N4p313.pdf> (free full text)

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SUMMARY

We describe the public health control measures implemented in Singapore to limit the spread of influenza A (H1N1-2009) and mitigate its social effects. We also discuss the key learning points from this experience. Singapore's public health control measures were broadly divided into 2 phases: containment and mitigation. Containment strategies included the triage of febrile patients at frontline healthcare settings, admission and isolation of confirmed cases, mandatory Quarantine Orders (QO) for close contacts, and temperature screening at border entry points. After sustained community transmission became established, containment shifted to mitigation. Hospitals only admitted H1N1-2009 cases based on clinical indications, not for isolation. Mild cases were managed in the community. Contact tracing and QOs tapered off, and border temperature screening ended. The 5 key lessons learnt were: (1) Be prepared, but retain flexibility in implementing control measures; (2) Surveillance, good scientific information and operational research can increase a system's ability to manage risk during a public health crisis; (3) Integrated systems-level responses are essential for a coherent public health response; (4) Effective handling of manpower surges requires creative strategies; and (5) Communication must be strategic, timely, concise and clear. Singapore's effective response to the H1N1-2009 pandemic, founded on experience in managing the 2003 SARS epidemic, was a whole-of-government approach towards pandemic preparedness planning. Documenting the measures taken and lessons learnt provides a learning opportunity for both doctors and policy makers, and can help fortify Singapore's ability to respond to future major disease outbreaks. PMID: 20473458 [PubMed - indexed for MEDLINE]

READING 7 – H1N1 – duties of healthcare professionals

Voo TC, Capps B. Influenza pandemic and the duties of healthcare professionals. Singapore Med J. 2010 Apr;51(4):275-81. Review. PubMed PMID: 20505904.

URL: <http://smj.sma.org.sg/5104/5104ra1.pdf> (free full text)

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Comment in:

Singapore Med J. 2010 Dec;51(12):973

SUMMARY

Preparing for an influenza pandemic presents significant scientific and administrative challenges. Governments can learn from measures implemented during past infectious disease epidemics and pandemics, and organise the nation's infrastructure and resources, particularly human resources, for efficient and effective mobilisation for such future events. This should include both the biomedical and ethical dimensions. In this paper, we discuss a critical ethical issue that will arise in preparation for and in response to an influenza pandemic, namely, the role and duties of healthcare workers. It is the aim of this paper to highlight the basis and scope of healthcare workers' duty of care during a pandemic. PMID: 20505904 [PubMed - indexed for MEDLINE]

READING 8 – H1N1 seroconversion rates

Chen MI, Lee VJ, Lim WY, Barr IG, Lin RT, Koh GC, Yap J, Cui L, Cook AR, Laurie K, Tan LW, Tan BH, Loh J, Shaw R, Durrant C, Chow VT, Kelso A, Chia KS, Leo YS. 2009 influenza A(H1N1) seroconversion rates and risk factors among distinct adult cohorts in Singapore. JAMA. 2010 Apr 14;303(14):1383-91. PubMed PMID: 20388894.

URL: <http://jama.ama-assn.org/content/303/14/1383.long>

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SUMMARY

CONTEXT: Singapore experienced a single epidemic wave of 2009 influenza A(H1N1) with epidemic activity starting in late June 2009 and peaking in early August before subsiding within a month.

OBJECTIVE: To compare the risk and factors associated with H1N1 seroconversion in different adult cohorts.

DESIGN, SETTING, AND PARTICIPANTS: A study with serial serological samples from 4 distinct cohorts: general population (n = 838), military personnel (n = 1213), staff from an acute care hospital (n = 558), and staff as well as residents from long-term care facilities (n = 300) from June 22, 2009, to October 15, 2009. Hemagglutination inhibition results of serum samples taken before, during, and after the epidemic and data from symptom questionnaires are presented.

MAIN OUTCOME MEASURES: A 4-fold or greater increase in titer between any of the 3 serological samples was defined as evidence of H1N1 seroconversion.

RESULTS: Baseline titers of 40 or more were observed in 22 members (2.6%; 95% confidence interval [CI], 1.7%-3.9%) of the community, 114 military personnel (9.4%; 95% CI, 7.9%-11.2%), 37 hospital staff (6.6%; 95% CI, 4.8%-9.0%), and 20 participants from long-term care facilities (6.7%; 95% CI, 4.4%-10.1%). In participants with 1 or more follow-up serum samples, 312 military personnel (29.4%; 95% CI, 26.8%-32.2%) seroconverted compared with 98 community members (13.5%; 95% CI, 11.2%-16.2%), 35 hospital staff (6.5%; 95% CI, 4.7%-8.9%), and only 3 long-term care participants (1.2%; 95% CI, 0.4%-3.5%). Increased frequency of seroconversion was observed for community participants from households in which 1 other member seroconverted (adjusted odds ratio [OR], 3.32; 95% CI, 1.50-7.33), whereas older age was associated with reduced odds of seroconversion (adjusted OR, 0.77 per 10 years; 95% CI, 0.64-0.93). Higher baseline titers were associated with decreased frequency of seroconversion in community (adjusted OR for every doubling of baseline titer, 0.48; 95% CI, 0.27-0.85), military (adjusted OR, 0.71; 95% CI, 0.61-0.81), and hospital staff cohorts (adjusted OR, 0.50; 95% CI, 0.26-0.93). **CONCLUSION:** Following the June-September 2009 wave of 2009 influenza A(H1N1), 13% of the community participants seroconverted, and most of the adult population likely remained susceptible. PMID: 20388894 [PubMed - indexed for MEDLINE]

READING 9 – Real-time epidemic monitoring and forecasting

Ong JB, Chen MI, Cook AR, Lee HC, Lee VJ, Lin RT, Tambyah PA, Goh LG. Real-time epidemic monitoring and forecasting of H1N1-2009 using influenza-like illness from general practice and family doctor clinics in Singapore. PLoS One. 2010 Apr 14;5(4):e10036. PubMed PMID: 20418945; PubMed Central PMCID: PMC2854682.

URL: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2854682/?tool=pubmed> (free full text)

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SUMMARY

OBJECTIVES: This study evaluated attitudes toward elder mistreatment from the perspective of older care recipients; their foreign home care workers, and their family members.

METHODS: Overall, 88 older care recipients, 142 family members, and 127 foreign home care workers responded to a hypothetical case vignette querying about the appropriate care of an older woman who suffers from neuropsychiatric symptoms in dementia.

RESULTS: Foreign home care workers tended to be more lenient toward elder mistreatment relative to older adults and their family members and to view as effective techniques that would non-equivocally be considered abusive and ineffective by current standards.

CONCLUSIONS: Interventions should inform these stakeholders about what constitutes elder mistreatment and should be particularly geared toward addressing cultural differences in the perception of elder mistreatment.

PMID: 20455116 [PubMed - indexed for MEDLINE]

READING 10 – SARS – Lessons learnt

Koh D, Sng J. Lessons from the past: perspectives on severe acute respiratory syndrome. Asia Pac J Public Health. 2010 Jul;22(3 Suppl):132S-136S. PubMed PMID: 20566545.

URL: http://aph.sagepub.com/content/22/3_suppl/132S.long (free full text)

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SUMMARY

On March 12, 2003, the World Health Organization issued a global health alert stating that a new, unrecognizable, flulike disease may spread to health care workers (HCWs). We now know this illness as severe acute respiratory syndrome (SARS). By August 2003, there were 8422 SARS cases and 916 deaths reported from 29 countries. SARS galvanized the world to the threat of emerging infectious diseases and provided a dress rehearsal for subsequent challenges such as H5N1 and H1N1 influenza. Among the insights gained were the following: SARS reminded us that health care work can be hazardous; the effects of SARS extended beyond the infection; general principles for prevention and control were effective against SARS; and SARS posed both a public health and an occupational health threat. Given these perspectives gained, we should be better prepared when faced with similar scenarios in the future. PMID: 20566545 [PubMed - indexed for MEDLINE]



ORIGINAL PAPER

- **Diabetes Mellitus and Fasting During Ramadan**

DIABETES MELLITUS AND FASTING DURING RAMADAN

Dr Chong Tsung Wei

ABSTRACT

Objective:

To review how commonly do diabetic Muslims fast, how safe is it to fast, who should not fast, and what is the optimal therapeutic regimen during Ramadan.

Methods:

Articles were identified from a Medline search on 19 Nov 2010 using MESH terms “diabetes mellitus”, “Islam” and “fasting” for articles from 1979 to date. Hand search of references of review articles was also done. Randomized controlled and observational trials were shortlisted and critically appraised.

Results:

15 articles were shortlisted for review. Fasting is common among Muslim type 2 diabetics and to a lesser extent for type 1 diabetics. Fasting is generally safe for type 2 diabetics without complications. Hardly any evidence exists on the safety of fasting for high risk patients. There is some evidence that switching from soluble insulin to insulin Lispro may be beneficial. There is also some evidence that pioglitazone may improve glycaemia in poorly controlled diabetics without increasing the risk of hypoglycaemia.

Conclusion:

Fasting may be done safely for selected diabetic patients in Ramadan. Treatment should be individualized.

Keywords: diabetes mellitus, fasting, Ramadan

SFP2011; 37(2): 52-59

INTRODUCTION

Singapore is a multicultural and multi-religious society with a significant proportion of Muslims. According to the National Census 2000, there are 371,660 Muslims in Singapore, who make up almost 15% of the population. Virtually all Malays and slightly over a quarter of all Indians practice Islam. In the National Health Survey 2004, the prevalence of diabetes mellitus was 15.3% of Indians and 11.0% of Malays. The control of diabetes in Muslim patients is particularly challenging when it comes to the fasting month of Ramadan. Until recently, little was known about the glycaemic control for fasting, diabetic Muslim patients during the month of Ramadan, whether fasting is safe for this population and what is the optimal therapeutic

regimen during Ramadan. A number of reviews have been published in recent years perhaps highlighting the need to consolidate evidence in an area which has not had high priority in the field of diabetes research.

Background to fasting in Ramadan

Sawm or fasting in the month of Ramadan is one of the five pillars of Islam. It is an obligation for every adult Muslim man and woman to fast. In Islam, fasting goes beyond the mere physical act of abstinence from food but also carries great moral and spiritual significance. There are exemptions for those who are not in a condition to fast, especially when fasting may lead to harmful consequences. These include ill persons, the old and weak, pregnant and nursing mothers. Children, who have not reached the age of puberty, are not required to fast but are not forbidden to do so.

Fasting involves abstaining from any food, drink, smoking and oral medications from dawn to sunset. Insulin injections, blood taking, using inhalers for asthma and vaccinations do not invalidate the fast. Muslims who fast generally have two meals a day during this month. One at sunset called Iftar (in Arabic) and one at predawn called Suhur. Majlis Ugama Islam Singapura or MUIS, the only Islamic governing body in Singapore, gives guidance on fasting which is available from their website at www.muis.gov.sg.

OBJECTIVE

To review and critically appraise the available evidence with regards to the following:

- How commonly do Muslim diabetics fast in Ramadan?
- Is it safe for diabetics to fast during Ramadan?
- Which patients should be advised not to fast?
- For those who fast, what is the optimal therapeutic regimen?

METHODS

A Medline search was conducted on 19 Nov 2010 using MESH terms “diabetes mellitus”, “Islam” and “fasting” for articles from 1979 to date. This yielded 76 articles. Titles and abstracts were reviewed for relevance and full articles were obtained. Randomized trials and observational studies were included. Brief reports, case reports and case series were excluded. Studies solely on biochemical markers without clinical outcomes and articles not in the English language were also excluded. As only one database was used, a hand search of relevant studies referenced in other reviews was also conducted. Full texts of shortlisted articles were obtained except for one, for which only

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the abstract was available (described in table 3). Evidence was evaluated using the checklists and grading levels in the Scottish Intercollegiate Guidelines Network 50: A guidelines developer's handbook (revised edition January 2008). See Annex A.

RESULTS

15 articles were shortlisted for this review.

How commonly do Muslim diabetics fast in Ramadan?

No substantial data was available until the large epidemiological study by the EPIDIAR (Epidemiology of Diabetes and Ramadan) group. This was a cluster sampled, interviewer conducted, questionnaire on 12,243 Muslim diabetic patients in 13 countries for the month of Ramadan in 2001. In this study, 42.8% of type I and 78.7% of type II diabetics fasted for at least 15 days during the month of Ramadan. There were marked differences between countries in the proportion who fasted, ranging from 9.4% to 71.6% for type I diabetics and 57.8% to 89.8% for type II diabetics. The average number of fasting days was 23 days and 27 days for type I and type II diabetics respectively.

A more recent questionnaire survey conducted in Pakistan found that 327 of 453 diabetic subjects (72.2%) fasted during the month of Ramadan. Sex distribution was fairly equal and the mean age was 50.3 years. The vast majority of those who fasted were type II diabetics (96.3%) and subjects fasted for an average of 25 days.

No local data is available but it would be reasonable to assume that fasting is common among Muslim type 2 diabetics and perhaps less so for type 1.

Is it safe for diabetics to fast during Ramadan?

The biggest concern for diabetics who fast during Ramadan is the risk of hypoglycaemia. On the other hand, the excessive consumption of sweet and fried foods, prepared traditionally for Ramadan, especially with the Iftar meal may instead predispose to hyperglycaemia.

The EPIDIAR study defined severe hypoglycaemia as hypoglycaemia leading to hospitalization. Rates of severe hypoglycaemic episodes was significantly higher during Ramadan compared to the other months of the year, 0.14 vs 0.03 episodes/month/patient for type 1 and 0.03 vs 0.004 episodes/month/patient for type 2 respectively. A significant percentage of patients changed their drug regimens themselves with detrimental effects. One in four of those on oral antidiabetic drugs and one in three of those on insulin changed doses during Ramadan. Severe hypoglycaemic episodes were associated with change in oral antidiabetic drug dose, change in insulin dose and change in level of physical activity. Severe hyperglycaemia but not hypoglycaemia, was associated with changes in food or sugar intake.⁸ (Level 3)

The study from Pakistan found a prevalence of 21.7% for hypoglycaemia and 19.8% for hyperglycaemia during Ramadan. The prevalence of severe hypoglycaemia and severe hyperglycaemia were 4% and 8% respectively. In contrast to the EPIDIAR study, this study did not find any relationship between hypoglycaemia or hyperglycaemia and changes in medication timing, diet and physical activity.⁹ (Level 3)

The data from the above two studies have some drawbacks. The EPIDIAR study used historical controls to determine if complication rates were higher during Ramadan. The results of this retrospective survey are also dependent on patient recall which is not necessarily reliable. The reporting of glycaemic symptoms in both studies was subjective but the Pakistan study did have some blood glucose levels on record, with a mean of 73mg/dL (4.1mmol/L) for hypoglycaemia and 277mg/dL (15.4mmol/L) for hyperglycaemia.

One recent study found an increased number of hypoglycaemic events during Ramadan as compared to non-fasting periods, but the incidence of severe hypoglycaemia was low²⁰.

The EPIDIAR group also collected data on diabetes management. Only 68% and 62% of type I and type II diabetics respectively who fasted, received recommendations from health care providers.⁸

It would seem that patient education prior to the start of Ramadan might have a place in improving patient safety. This hypothesis was tested in a recent retrospective cohort study on type II diabetics. In this study, 57 patients attended a 2-hour education programme while 54 patients in the control group were invited but did not attend. There was a significant decrease in hypoglycaemic events in the education group compared to the control group which had a four-fold increase in hypoglycaemic events ($p < 0.001$). The absolute risk reduction in hypoglycaemic events by patient education was calculated at 58.2%. However, it was not clear from the study whether this effect was due to education or due to reductions in sulphonylurea dose. There may have been selection bias with patients in the education group being more motivated to maintain good glycaemic control. (Level 2-)

The risk of hypoglycaemia does appear to be raised during Ramadan (Level 3). The main reasons for this could be the lack of education to patients on management issues, inadequate attendance and monitoring during Ramadan and patients adjusting their diets and medications of their own accord.

There is no local data on the safety of fasting during Ramadan.

Which patients should be advised not to fast?

As a follow on to the EPIDIAR study, the American Diabetic Association (ADA) published a workgroup report making recommendations on fasting in Ramadan. The recommendations were based on expert opinion rather than hard data. Their emphasis was that the decision to fast is a personal one and should be made after ample discussion of the

associated risks with the attending physician. They suggested categorizing patients according to their risk profile (see Table 1). In addition, those with brittle control or unwilling or unable to monitor glycaemia should be strongly discouraged from fasting. Pregnant women should also be strongly advised not to fast. (Level 4)

Table 1. Categories of risks in patients with type 1 or type 2 diabetes who fast during Ramadan

Very high risk

Severe hypoglycaemia within the last 3 months prior to Ramadan
Patient with a history of recurrent hypoglycaemia
Patients with hypoglycaemia unawareness
Patients with sustained poor glycaemic control
Ketoacidosis within the last 3 months prior to Ramadan
Type 1 diabetes
Acute illness
Hyperosmolar hyperglycaemic coma within the previous 3 months
Patients who perform intense physical labour
Pregnancy
Patients on chronic dialysis

High risk

Patients with moderate hyperglycaemia (average blood glucose between 150 and 300 mg/dl, A1C 7.5–9.0%)
Patients with renal insufficiency
Patients with advanced macrovascular complications
People living alone that are treated with insulin or sulfonylureas
Patients living alone
Patients with co-morbid conditions that present additional risk factors
Old age with ill health
Drugs that may affect mentation

Moderate risk

Well-controlled patients treated with short-acting insulin secretagogues such as repaglinide or nateglinide

Low risk

Well-controlled patients treated with diet alone, metformin, or a thiazolidinedione who are otherwise healthy

Source: American Diabetic Association¹¹

Most of the trials in this review had exclusion criteria for high risk patients e.g. those with cardiac or renal failure, recurrent hypoglycaemia. There is therefore hardly any evidence on fasting amongst high risk populations.

Only one study identified predictors for hypoglycaemia during Ramadan²⁰, although this was not the main objective of the study. Hypoglycaemic events were analysed as the number of events rather than as rates. Fasting blood glucose at the start of Ramadan correlated with the risk of hypoglycaemic events during Ramadan, Odds Ratio OR 0.984 (Confidence Interval CI 0.976-0.992) ($p < 0.0002$) while HbA1c before Ramadan correlated with asymptomatic hypoglycaemic events during Ramadan OR 0.575 (CI 0.396-0.835) ($p = 0.0036$). No predictive model was derived and validated from these findings. On multivariate analysis, two factors were found to predict a higher risk of hypoglycaemic events: subjects in countries with stricter Ramadan observance (Indonesia, Malaysia, Saudi Arabia) OR 3.24 (95%CI 1.70-6.36) ($p = 0.0004$) and low waist circumference (< 90 cm) OR 2.75 (95%CI 1.27-5.95) ($p = 0.01$).

Fasting blood glucose > 6.7 mmol/L just before Ramadan had a protective effect against hypoglycaemic events OR 0.48 (95%CI 0.24-0.95) ($p = 0.03$). It was not clear if all the available data were considered in the bivariate and multivariate analysis for predicting hypoglycaemic events. (Level 2+)

For those who fast, what is the optimal therapeutic regimen?

The ADA workgroup¹¹ suggested that care of the fasting diabetic must be highly individualized. Medical assessment and education should take place before the start of fasting. There should be frequent monitoring of glycaemia, especially those on insulin. A healthy balanced diet should be maintained and a constant body mass maintained. Complex carbohydrates are recommended at the predawn meal, which should be taken as late as possible and simple carbohydrates at the sunset meal. Fluid intake should be increased in the non-fasting hours. A normal level of activity should be maintained, avoiding excessive activity in the hours before the sunset meal. The fast should be broken if glucose levels fall below 60mg/dl or 3.3mmol/L or if below 70mg/dl or 3.9mmol/L in the few hours after the start of the fast (especially those on insulin or secretagogues) or if above 300mg/dl or 16.7mmol/L. (Level 4)

The following therapeutic regimens were suggested by the ADA workgroup. (Level 4)

Type 1 Diabetes

Therapeutic options:

1. NPH insulin BD and short acting insulin before meals.
2. Ultralente BD with short acting insulin before meals.
3. Insulin glargine OD or insulin detemir BD.
4. Intermediate acting insulin BD with insulin lispro before meals.
5. Subcutaneous insulin pump.

Type 2 Diabetes

Recommended changes:

1. Diet control – to take 2 to 3 smaller meals and modify exercise.
2. Metformin – 2/3 daily dose at sunset, 1/3 daily dose at dawn.
3. Glitazones – no change is required.
4. Sulphonylureas – treatment should individualized and use with caution.
 - a. Once daily before the sunset meal or
 - b. Half the usual morning dose at the predawn meal and full dose at the sunset meal.
5. Short acting secretagogues – may be safer than sulphonylureas
6. Premixed insulin 70/30 – Usual morning dose at sunset meal and half the usual evening dose at predawn meal. Consider changing to glargine or detemir plus lispro or aspart.

Studies of therapeutic options during fasting in Ramadan have been done almost exclusively in type 2 diabetics. Only one trial was conducted on type 1 diabetics¹⁴. The methodological quality of trials was variable. The common weaknesses were the lack of non-fasting controls, lack of blinding, lack of adjustment for confounding factors (e.g. diet, activity), lack of intention-to-treat analysis, heterogeneous interventions (variable drug regimens & dosages) and heterogeneous comparison groups. A few studies had non-fasting control groups but the control groups were neither randomly allocated nor matched^{12,18,19}. Only two studies had biochemical inclusion criteria^{18,19}. The majority had exclusion criteria such as renal, liver or cardiac impairments, severe diabetic complications and recurrent hypoglycaemia. Most studies relied on hypoglycaemic symptom reporting without biochemical confirmation. Only two studies had routine capillary glucose checked during fasting hours^{18,20}, while the others did not, primarily for religious reasons. The definition of severe hypoglycaemia was variable and ranged from hypoglycaemia requiring assistance from another person to hypoglycaemia requiring hospital admission.

1. Insulin & Insulin Analogues

Two randomized studies comparing insulin lispro and soluble insulin were identified. Both studies had similar designs, comparing insulin lispro and soluble insulin with a crossover 14 days after the start of Ramadan. The trial by Akram and the Ramadan Study Group¹³ on 70 type 2 DM participants was of good methodological quality and showed that post-meal glucose excursion was significantly lower with insulin lispro than with soluble insulin. Although the number of patients having hypoglycaemic events were similar in both groups, those on Lispro had significantly fewer hypoglycaemic episodes. No severe hypoglycaemic events were reported (Level 1++). The second trial on participants with type 1 DM, showed similar results but was methodologically less robust¹⁴ (Level 1-).

Matoo et al¹⁵ from the Ramadan Study Group also showed in a randomized trial that using Lispro Mix 25 resulted in lower glucose excursion after the evening meal compared with Humulin 30/70, without any difference in rates of hypoglycaemia. (Level 1+)

The evidence of improved diabetic control in a cohort trial comparing Humalog Mix 50 and Insulin Mix 30 was less convincing as it was unclear if both groups were comparable at treatment allocation²². (Level 2-)

2. Sulphonylureas

In a study of 591 type 2 diabetic subjects¹², two different glibenclamide dose regimens were compared along with a self-selected, non-fasting control group. Fasting subjects were randomized to one of two regimens: normal daily dose with dosage pattern reversed (morning dose switched to evening and vice versa); or dosage pattern reversed but daily dose reduced by 25%. There were no significant differences in fructosamine levels, percentage of glycated haemoglobin and hypoglycaemic

events between the three groups. However, it should be noted that patients in this study had very poor diabetic control, the baseline glycated haemoglobin level ranging from 13.2% to 14.3% between the three groups. (Level 1+)

More studies involving sulphonylureas are discussed below.

3. Biguanides and alpha-glucosidase inhibitors

There were no trials which studied the use of these agents during Ramadan but metformin is generally considered to be safe¹¹.

4. Meglitinides

In a randomized controlled trial by the Ramadan Study Group¹⁶, repaglinide produced greater decreases in fructosamine levels and lower rates of hypoglycaemic events compared with glibenclamide. However, the groups were not comparable at baseline and drug dosages were not handled in a similar manner. (Level 1-)

Two cohort studies comparing fasting and non-fasting groups did not find any significant difference in glucose parameters between groups. Cesur et al¹⁸ studied the use of glimepiride, repaglinide or glargine, in addition to metformin during Ramadan. It was unclear if the comparison groups were similar at baseline or if any drug adjustments were made in the control group. The number of patients experiencing hypoglycaemia was similar in both groups. Bakiner et al¹⁹ studied repaglinide and glargine but the subject numbers was small and intention-to-treat analysis was not performed. No hypoglycaemic events were reported. (Level 2-)

A study comparing repaglinide and glimepiride was identified but the full text could not be obtained for this review. (see table 3)

5. Thiazolidinediones

Hyperglycaemia is also a problem during Ramadan and some studies look at how glycaemic control could be improved. In a small randomized controlled trial¹⁷, adding pioglitazone negated the rise in fructosamine levels which was seen in the control group, without increasing the incidence of hypoglycaemic events (Level 1++). The subjects in this trial had somewhat poor diabetic control at baseline.

6. Incretin Mimetics and Dipeptidyl peptidase-4 (DPP-4) inhibitors

The therapeutic arsenal in diabetes has expanded in recent years with the addition of incretin mimetics and Dipeptidyl peptidase-4 (DPP-4) inhibitors. A small study²¹ showed that the incidence of hypoglycaemic events during Ramadan was lower in the vildagliptin group as compared to the gliclazide group with both groups having similar declines in HbA1c. However, it was not clear that the subjects in each group were similar at treatment allocation. (Level 2-)

No studies on incretin mimetics were found.

Table 2. Summary of trials on therapeutics

Name/Year	Study Design	Subjects	Results	Level of Evidence
Belkhadir ¹² 1993	Randomized controlled trial Usual or 75% daily dose glibenclamide with reversed dosage pattern with non-fasting control group	591 Type 2 DM	Change in fructosamine level from start to end of Ramadan Full dose group 367±80µmol/L to 381±96µmol/L 75% dose group 359±82µmol/L to 376±98µmol/L Non-fasting group 396±91µmol/L to 400±102µmol/L Number of hypoglycaemic events Full dose group (n=183) 14 75% dose group (n=182) 10 Non-fasting group (n=177) 11	I+
Akram ¹³ 1999	Open label Randomized Crossover Insulin Lispro or soluble insulin BD with crossover after 14 days + NPH insulin BD	70 Type 2 DM	Rise in blood glucose 2hr after sunset meal Lispro group 2.6±0.4mmol/L Soluble insulin group 4.0±0.5mmol/L (p<0.008) Hypoglycaemia frequency (episodes/patient/14 days) Lispro group 1.3±0.1 (p<0.002) Soluble insulin group 2.6±0.2 No severe hypoglycaemic events.	I++
Kadiri ¹⁴ 2001	Open label Randomized Crossover Insulin Lispro or soluble insulin BD with crossover after 14 days + NPH insulin BD	64 Type 1 DM	Rise in blood glucose 2hr after sunset meal Lispro group 2.50±0.46mmol/L Regular human insulin group 3.47±0.49mmol/L (p=0.026) Hypoglycaemia incidence Lispro group 15 patients (23.4%) Regular human insulin group 31 patients (48.4%) (p=0.004) Hypoglycaemia frequency (episodes/patient/30days) Lispro group 0.70±0.19 Regular human insulin group 2.25±0.36 (p<0.001)	I-
Matoo ¹⁵ 2003	Open label Randomized Crossover Lispro Mix25 or Humulin 30/70 with crossover after 14 days	151 Type 2 DM	Mean blood glucose evening glucose excursion Lispro Mix 25 group 3.4±2.9 Humulin 30/70 group 4.0±3.2 (p=0.007) Hypoglycaemia frequency (episodes/patient/14 days) Lispro Mix25 group 0.4±0.9 Humulin 30/70 group 0.4±0.8 (p=0.725)	I+
Mafauzy ¹⁶ 2003	Randomized Controlled Trial Repaglinide or glibenclamide	235 Type 2 DM	Change in fructosamine level from start to end of Ramadan Repaglinide group 389.69±84.6 to 370.89±86.43µmol/l Glibenclamide group 365.99±75.89 to 358.59±70.10µmol/l Hypoglycaemia frequency (episodes/patient/30 days) Repaglinide group 0.03 Glibenclamide group 0.05	I-
Vasan ¹⁷ 2006	Randomized Controlled Trial Pioglitazone or placebo + conventional oral hypoglycaemic agents	86 Type 2 DM	Fructosamine levels 2 weeks after Ramadan Pioglitazone group 336.45±76.20µmol/L Placebo group 381.94±112.99µmol/L (p=0.04) Number of hypoglycaemic events 39 in pioglitazone group & 32 in placebo group. (p=0.21) Number of severe hypoglycaemic events 0 in pioglitazone group & 2 in placebo group.	I++
Cesur ¹⁸ 2007	Prospective cohort with non-fasting control Glimepiride or repaglinide or glargine + metformin	65 Type 2 DM	No significant difference in comparison of changes in fructosamine levels between fasting and non-fasting groups. Significantly higher post-prandial blood glucose in non-fasting group than fasting group at post-Ramadan and one month post-Ramadan. (p<0.05 and p<0.001) No significant difference in incidence of hypoglycaemia between fasting (12.2%) and non-fasting groups (12.5%).	2-
Bakiner ¹⁹ 2009	Prospective cohort with non-fasting controls RepaglinideTDS and glargine ON	19 Type 2 DM	No significant differences between groups in fasting blood glucose post-prandial glucose and fructosamine levels. No hypoglycaemic events reported from either group.	2-
Salti ²⁰ 2009	Prospective cohort with non-fasting self controls Glimepiride OM and glargine ON	349 Type 2 DM	Number of hypoglycaemic events 346 during Ramadan vs 156 pre-Ramadan (p<0.001) and 153 post-Ramadan (p=0.0002) Not analyzed as rates. 1 episode of severe hypoglycaemia in each of the three study periods	2+

Devendra ²¹ 2009	Prospective cohort	52	Mean number of hypoglycaemic events before and after Ramadan	2-
	Vildagliptin or Gliclazide BD + metformin	Type 2 DM	Vildagliptin 0.42±0.5 to 0.08±0.3 ↓ Gliclazide 0.27±0.5 to 0.92±0.9 ↑ Least squares means difference between groups -0.66 (95%CI -1.20 to -0.13, p=0.0168) Hypoglycaemia incidence Vildagliptin group 7.7% Gliclazide group 61.5% Mean difference -53.8% (95%CI -74.9 to -26.3, p<0.0001) Number of severe hypoglycaemic events 1 in gliclazide group. None in vildagliptin group. Similar reductions in HbA1c in both groups.	
Hui ²² 2010	Prospective cohort	52	Mean number of hypoglycaemic events during and before Ramadan	2-
	Mixtard 30 at predawn & Humalog Mix 50 at sunset or Mixtard 30 BD	Type 2 DM	Humalog Mix 50 group 0.46±0.65 to 0.42±0.58 Mixtard 30 group 0.42±0.58 to 0.58±0.81 Not statistically significant. Least squares means difference between groups 0.135 (95%CI -0.26 to 0.43, p=0.36). Mean HbA1c Reduction in Humalog Mix 50 group 0.48% (p=0.0001) Increase in Mixtard 30 group 0.28% (p=0.007) Least squares means difference between groups 0.40% (95%CI 0.19-0.62, p=0.0004)	

Table 3. Summary of studies with only abstract available

Name	Description of study
Anwar	Open label comparative trial on repaglinide and glimepiride in 41 subjects. Glucose excursion was better for repaglinide in the morning but better for glimepiride in the afternoon and evening.

Discussion

There are inherent difficulties in conducting studies on fasting amongst diabetic Muslims in Ramadan. Each study should ideally include a non-fasting control group but randomization into fasting and non-fasting groups cannot be done for ethical reasons. Non-fasting controls would then be heterogeneous with respect to the study group. The option taken by some studies is to use the same study cohort during non-fasting months as a control, but there are many other confounding factors which occur during Ramadan. Confounders which are not easy to account for include accessibility to medical care, level of activity, diet and religious factors. Checking and documenting each hypoglycaemic episode biochemically is difficult for logistical and religious reasons hence studies are reliant on self reporting of symptoms.

Although the trial on education¹⁰ did not convincingly demonstrate that it could reduce the risk of hypoglycaemia, recent studies on drug therapeutics have usually included a component of education for all patients in preparation for Ramadan. As such, education on diet, activity and drug modification, recognizing and managing complications, should be provided to patients who intend to fast.

Insulin Lispro seems to be better than soluble insulin for diabetics who fast during Ramadan, probably because of a more

rapid onset of action (within 15 minutes of administration), earlier peak levels (30 to 90 minutes) and shorter duration of action (less than 5 hours). It is more costly than soluble insulin and this should be considered.

Repaglinide, with a rapid onset of action and short duration of action, should in theory be superior to sulphonylureas, but so far the evidence has not been robust enough to support it. Overall, no oral agent has been proven to be of greater benefit or safer than any other.

Most studies have concentrated on using alternative or additional agents, but it makes more sense to adjust existing medications to avoid adding costs to the patient. Only one study examined how the dosage pattern of usual medications could be modified for Ramadan¹². Although it showed how two different patterns of glibenclamide dosing were safe, the study population had high glycaemic indices and the results may not be generalized to populations with good control.

Given that the therapeutic options and study populations in the studies are so varied, it would follow that management of each diabetic patient wanting to fast for Ramadan should be individualized.

There are limitations with this review. Firstly, critical analysis of trials should have two reviewers and a third adjudicator in cases of disagreement. Secondly, only English language articles

were reviewed. There may be more data given that countries with predominantly Muslim populations may not publish studies in the English language or in western scientific journals. Unpublished results have been presented at international conferences but were not available for this review.

There is certainly still a lot more research to be conducted on this subject. Future studies should examine:

- a. Predictive models, including biochemical markers, for fasting safely during Ramadan.
- b. Optimal dosage pattern modifications.
- c. Non-pharmacological aspects of diabetic control, including diet, activity modification and patient education.

Recommendations

- 1. The management of each diabetic patient wanting to fast for Ramadan should be individualized. (GPP)
- 2. There is insufficient evidence on the safety for fasting for Type 1 diabetics. There is also hardly any evidence on the safety of fasting for high risk patients such as those with cardiac or renal failure, recurrent hypoglycaemia or in pregnancy. It would be prudent to advise against fasting

in these populations. The risk stratification table by the ADA (see above) may be useful in counseling patients on their risk. (Grade D, Level 4)

- 3. Although the risk of hypoglycaemia in Type 2 diabetics may be higher during Ramadan, those with good compliance and no complications may be able to fast safely. (Grade C, Level 2+)
- 4. Although there is insufficient evidence to show that patient education can reduce the risk of hypoglycaemia, it should nonetheless be provided for patients who wish to fast. (Grade D, Level 4)
- 5. In addition to the therapeutic options recommended by the ADA11, the following may be considered in Type 2 diabetics:
 - a. Insulin lispro reduces the glucose excursion and frequency of hypoglycaemia as compared to soluble insulin. Consider switching soluble to a rapidly acting insulin such as insulin lispro for the duration of Ramadan. (Grade B, Level 2++)
 - b. Pioglitazone may improve glycaemic control without increasing the risk of hypoglycaemia. Consider adding a thiazolidinedione for those with suboptimal glycaemic control. (Grade B, Level 1+).

ANNEX A

Scottish Intercollegiate Guidelines Network
Key to evidence statements and grades of recommendations

Levels of evidence	
1++	High quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias
1+	Well-conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias
1-	Meta-analyses, systematic reviews, or RCTs with a high risk of bias
2++	High quality systematic reviews of case control or cohort or studies High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal
2+	Well-conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal
2-	Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal
3	Non-analytic studies, e.g. case reports, case series
4	Expert opinion
Grades of recommendations	
A	At least one meta-analysis, systematic review, or RCT rated as 1++, and directly applicable to the target population; or A body of evidence consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating overall consistency of results
B	A body of evidence including studies rated as 2++, directly applicable to the target population, and demonstrating overall consistency of results or Extrapolated evidence from studies rated as 1++ or 1+
C	A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results or Extrapolated evidence from studies rated as 2++
D	Evidence level 3 or 4; or Extrapolated evidence from studies rated as 2+
Good practice points	
<input checked="" type="checkbox"/>	Recommended best practice based on the clinical experience of the guideline development group

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